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OF THE

COST OF PRODUCTION SEMINAR

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FOREWORD

The publication of the proceedings from the Cost of Production Seminar is intended to provide a summary of the papers presented on February 3, 1986. This seminar was hosted by the Economics and Policy Coordination Branch, OMAF. The theme of the seminar was the determination, use and implication of cost of production in agriculture. The purpose of this event was to provide a forum for discussion on the determination, use and implication of cost of production for agriculture in the past, present and future. From the response of the attendees, this purpose was fulfilled.

The seminar was attended by members of the agricultural sector, academic community, financial institutions, as well as provincial and federal governments. Papers were presented by a number of these attendees. The topics covered in these papers included, for instance, Implications of Cost of Production for Government Policy and Programs, as well as COP Uses and Requirements by Financial Institutions.

Several of the papers presented in this publication were revised and summarized by the editor. Any error in this process should be attributed to the editor and not to the authors.

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WELCOME AND INTRODUCTION

BOB SEGUIN
Director
Economics and Policy Coordination Branch

I would like to welcome all of you to today's Cost of Production Seminar hosted by the Economics and Policy Coordination Branch, Ministry of Agriculture and Food. It is a pleasure to have you here and I look forward to your presentations.

Cost of production, as I am sure you know and you will find out during these next two days, can be a nebulous creation. Methodologies, interpretations and accuracy, can all vary by uses, commodities and regions. However, the concept itself is well accepted and has become a necessary part of both farm management and general agricultural policy.

Rather than upstage this morning's speakers on the history, use and value of cost of production, I will turn the sessions to Fred Wind. But I would like to take this opportunity to thank all those involved in the development of today's sessions - notably Fred Wind, Al Fisher, Gervan Fearon and Pam Lee, for their efforts.

Now I will ask Fred Wind, Manager, Economic Information Systems, to introduce the first speaker. Enjoy the sessions.

AN OVERVIEW OF THE USE AND DEVELOPMENT OF COST OF PRODUCTION IN AGRICULTURE

EARL HASLETT

Cost of production is a subject that reaches back to the beginnings of commercial transactions. In agriculture, the cost of production concept has a high profile and often has been the subject of serious disputes. Farmers in all parts of the world have been interested in the topic. North American farmers placed increasing emphasis on their costs of production during the twentieth century. Cost figures have been used as a basis for improved management, as part of a plea for more equitable prices, and as a technique to help establish prices.

Cost of production data became of greater interest to farmers in Ontario during the 1940's when the ceiling prices established by the Canadian Wartime Prices and Trade Board encouraged farmers to think in terms of a floor price. Several Ontario producer groups promoted the use of cost of production data as an aid to establishing prices, but two groups were in the forefront. Producers of canning crops (peas, tomatoes and sweet corn) and potatoes moved to establish cost of production information as an aid to price determination.

The Potato Section of the Ontario Crop Improvement Association passed a resolution at its annual meeting in 1944 regarding the "need for reliable cost information in potato production". Growers were anxious to have cost figures to encourage the Wartime Prices and Trade Board to set prices at a "fair" level. A year previously (1943) a resolution had asked the Federal Government to establish a floor price prior to the planting period.

The Ontario Department of Agriculture would not undertake the study as a department project but provided advice and assistance. A Cost of Production Committee was formed to assist growers in compiling costs. Volunteer cooperators throughout Ontario returned partial cost records to the Committee during the 1944-47 period, but due to lack of staff the analysis was not completed until 1948.

After World War II canning crop producers contributed funds to have cost of production data compiled by the Department of Agricultural Economics at the Ontario Agricultural College. The costs were used in negotiations between growers and canning companies. Students collected cost information in the summer and the records were analyzed during the fall and winter months. The project was directed by Professor C.W. Riley.

The Ontario Government established a Cost Studies Branch in 1948, but soon renamed it the Farm Economics Branch. The Ontario Government's dealings with the Federal Government on farm prices during the war, and the obvious interest in farm costs in Ontario, provided an impetus to establish a capacity within Ontario to systematically collect cost data. The demand for floor prices was the most important factor leading to the establishment of the Branch. However, the farm management aspect of cost data also was recognized as a rationale for formation of the Branch, as illustrated in the 1948 Report of the Ontario Minister of Agriculture:

> The Farm Economics Branch was established during 1948 to assist the Department in assembling and distributing information based on how farms operate and the effect of methods used on costs and returns.

The Department chose Dr. Howard Patterson as the first Director of the Cost Studies Branch. Howard Patterson, a member of the Economics Division of the Federal Department of Agriculture, had experience in cost studies in Canada and the United States. He centralized and expanded cost of production work in Ontario. The work on canning crops was moved to the new Branch; records on the first potato study were analyzed and a new more comprehensive potato study initiated; and cost work started on hog and dairy farms. By 1955, information on production costs and farm management practices was available for 15 commodities.

In the following 30 years, cost of production work in Ontario was used constantly as a basis for price negotiations or price setting in several commodities, especially canning crops, tobacco and milk. Among the changes in cost of production work were the following:

1. A standardization of cost procedures, involving cost of production methodology, data to be collected, collection methods, and data analysis,

2. Establishment of regional cost of production offices and a specialization of resource people in certain commodities,

3. An interest in very specific parts of the production process, such as machinery costs, silo costs, cost of establishing orchards, etc.,

4. A move from large samples of cooperating procedures to small samples,

5. Attempts to increase the use of cost data for farm management purposes (e.g. the development of Farm Management Extension Specialists),

6. A greater use of computers in several aspects of cost work, including cost calculations by farm operators, development of cost of production models, and analysis of cost data,

7. More use of the consensus method of establishing farm costs by using a small group of producers and commodity experts,

8. An increasing tendency to construct a synthesized enterprise model,

9. An increase in the use of cost data for policy development and analysis purposes - encouraged by the income stabilization programs of federal and provincial governments,

10. More questioning in recent years as to the amount of cost work that should be done, how it should be done, and who should be doing it.

The key to an understanding of the use and development of cost of production in agriculture is a realization that cost of production is a "fighting concept". Initially most efforts to establish a cost of production program in a jurisdiction came from a belief of producers that prices were too low and that they had to fight for change.

The cost of production concept, as a fighting concept, serves producers in four ways:

- As the foundation for a general plea that farmers receive more equitable prices,

- As a focus for bargaining between buyer and seller in situations where such bargaining is possible,

- As a basis for price setting when producer groups have a legislative mandate to set prices,

- As an input into policy development, especially when governments are involved in price supports and income stabilization programs.

One of the continuing and unresolved problems in cost of production work is the concept of cost of production - it has different meanings to various groups - economists, accountants, and farmers. For example, an economist might define cost as the outlay that must be made out of revenue from sales to retain production at the present scale. A producer might define cost as the price necessary to fulfill the legitimate aspirations of the producer, that is to pay debts and enjoy a decent standard of living.

Large amounts of cost data exist for farm management purposes because of the interest in cost information for other reasons. Cost data, combined with some financial and market information, form a good basis for analyzing a farm business and making recommendations - as long as analysts and practitioners realize the limitations inherent in the farm management subject area.

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COST OF PRODUCTION USE AND REQUIREMENTS OF FINANCIAL INSTITUTIONS

DOUG LANE

We are going through a period of change. In the 1970's, the emphasis was on growth as real interest rates were low. Inflation tended to cover up many of our mistakes.

In the 1980's it is a different story, most farm product prices have declined, land values have fallen and we have gone through a period of extremely high interest rates. Farmers who used debt to expand are losing equity and experiencing repayment difficulties. The emphasis once more is going to be on management, as growth will be dependent on net income and not on inflation.

Controlling loan losses is going to be in the forefront. Our ability to assess risk is becoming more and more important. Financial institutions will stress service as opposed to being a commodity warehouse. All of this means a greater need for cost of production information.

I do not think our use and needs for cost of production data differs substantially from other financial institutions. However, due to our mandate, we do service farmers with less equity and tighter repayment capacities in most cases. We also follow up many of our loans with Advisory Services and thus our needs may be somewhat greater.

Uses of Cost of Production Data

Loan evaluation COP information is vital to assessing any loan application. If an applicant is already established and has good COP records of his own, they are invaluable in assessing his repayment ability. However, we do not encounter this situation very often; it is more usual to be dealing with an applicant who is a beginning farmer or one who has poor past records. In these situations, we rely on COP information from other sources.

Let me digress here a moment to discuss a major concern in our needs for COP data. There is very little information available to measure management. How long does it take a beginning farmer to reach his potential? What is the difference in net income between a good and poor manager? We hope to be able to better answer some of these questions as we improve our system of data collection with the introduction of micro computer technology. We feel that it is very important to know what range of yields and prices may occur for each commodity and for a range of management levels.

Complicating the problem of obtaining this type of data is the number of different enterprises that we have to deal with in this province. We have to be knowledgeable in such rarities as fish farming, rabbits, mushrooms and all types of greenhouse production.

Assessment of Current Agricultural Financial Stress

What percent of farmers are really in trouble? 5%?, 10%?, 20%? The Corporation is presently embarking on a program to collect better farm level data. This will involve setting up a series of "micro-labs". Through this project we hope to be able to get a better handle on the current agricultural situation.

Monitoring the Risk of the Lender's Portfolio

Better COP information is needed to assess our present loan portfolios. As of January 1, 1986, FCC had close to 4,000 borrowers in the province who are in arrears for an amount in excess of $68 million. We are making a concerted effort to counsel these borrowers and trying to keep them on the farm. Part of this process will include data collection which should help us better understand the reasons for being in arrears.

Banks will not have this level of risk in their portfolios, however, there is a need for all lenders to continuously monitor their portfolios and to estimate loan losses. FCC attempts to establish a loss factor for each loan as it is made. This factor considers enterprise, equity, loan to security ratio and loan size.

Counselling

Corporation employees spend a large percentage of their time in counselling. In both pre-loan and post-loan counselling, we use COP figures extensively for doing partial budgets, cash flows and risk analysis.

For any borrower wishing a post-loan counselling, the Corporation has an advisory services program to assist him in setting up a bookkeeping system, if necessary, and to help him analyze his statements to lead to better decision making. At present FCC is cooperating with OMAF and putting many farms on the Ontario Farm Management Analysis Project. We found this year that our staff are enthusiastic about the project as they have meaningful information to take back to the farmers. Hopefully, this can be meaningful to the farmer and promote better bookkeeping.

Training

The final aspect of our work which involves COP data is training. We have an ongoing program of training in financial and business management as well as in risk analysis. As I mentioned at the beginning, we feel that expertise in these areas is a necessity in today's lending environment.

I alluded to microcomputers earlier. We have micros in our Regional Office and in two of our District Offices at present. In April, we will have micros in all District Offices. We have software to analyze a farmer's records and to show his financial progress, to produce pro forma balance sheets and income statements, and to do risk analysis. To make the best use of this software, we require good COP figures.

In summary we use cost of production data in the following areas: loan evaluation, assessment of agricultural stress, monitoring our portfolio, counselling and training.

The need for good COP data has never been greater. I congratulate the Economics and Policy Coordination Branch for addressing this timely topic and thank you for inviting me to participate.

IMPLICATIONS OF COP IN GOVERNMENT POLICY AND PROGRAMS

PROVINCIAL PROGRAMS

MARTIN JAEGER

INTRODUCTION

The subject assigned to me - cost of production and Ministry programs - properly recognizes that for OMAF, cost of production studies are not an end in themselves but serve as handmaidens for other goals and programs.

While some form of cost of production knowledge is commonly required for many programs and initiatives, the specific information needed will vary from one to another. Accordingly, the requirement is for either pre-agreement between user and generator on the form and content of the final product, or the generation of results in a form which permits flexibility in use (easier said than done).

The following realities bedevil those who generate and those who use cost of production data.

1. Whatever approach is used - engineering approach, survey approach or consensus approach, the results can generate a good deal of controversy where they form the basis of a governmental or agency decision affecting monetary outcomes. The expected use of the findings can result in cooperators providing "biased" data.

2. Much of agricultural production involves owned inputs. What returns should be attributed to these inputs for cost of production study purposes is a difficult question for which no satisfying answer is possible.

3. Much of agricultural production involves joint inputs and/or outputs. Allocation of expense and revenue is another question for which no fully satisfying answer can be obtained.

4. Various techniques, input packages and efficiency levels prevail so that overall industry averages may not well represent the universe.

For these reasons, cost of production findings are doomed to be controversial. This partly explains the reluctance to link programs to cost of production findings.

A second reason for the reluctance is that cost of production is only one blade of the scissors. The other is demand. Guarantees or subsidies, based on cost of production alone, limit the influence of demand in guiding the economy toward the "correct" level of production and disposition of resources.

A third related point is that production cost is, as presently used (though not necessarily), an average rather than a marginal concept. For many applications the average is a far less useful tool than the marginal.

Not long ago our Branch was reorganized - with the Production Section being replaced by the Financial Analysis Section. This change recognized the fact that even given equal technical efficiency - (operation on the production possibilities

frontier and at the correct point on the frontier) two farms can be in greatly different economic health based on differences in financing, marketing and risk management.

The COP notion generally relates to what is happening on the farm. For many farm firms, economic health now is more dependent on what happens at the market, and in the banker's office.

Let me now briefly cite some Ministry uses of cost of production information.

APPLICATIONS

Interest Rebates

A variety of Ministry programs exist. Typically, they select a group based on: a) equity levels; and b) survivability.

The applicant will be required to submit a financial plan. To receive the grant, he must demonstrate that given the expected level of fixed expense, his firm will have an output/cost result which will generate a cash flow adequate for survival.

Note the emphasis on cash flow. Even if the producer produces inefficiently, or pays too much for his inputs, or does not sell his product to advantage, his operation may be deemed to be survivable if he starts with a high equity level or debt that is locked in at a low interest rate.

The analyst looking at the application will use general cost of production studies as a guideline to see if the financial plan submitted is feasible. Cash flow is his interest. Given the program guidelines, he is not interested in the total cost of production for the farm or whether the individual is a high or low cost producer.

Financial Advice

An extension worker being asked for advice as to whether a producer should stay in production or not will take a different approach. He will compare the farmer's prospects by comparing his present and potential cost of production to the industry norm, and comparing the return to the farmer's resources if used within or outside agriculture. Note that the latter involves taking an opportunity cost approach to the inputs used in the operation.

Practice Evaluation

A good deal of the Ministry's extension effort is aimed at improving the technique employed by Ontario's farmers so as to heighten competitiveness and increase the standards of living. This requires knowledge of costs under varying techniques. Commonly an engineering approach is used for this purpose.

Insurance

Some types of crop insurance require knowledge of costs actually involved. For example, the Ministry crop insurance program has replanting provisions covering losses from early frost. The plan requires knowledge of actual expenses involved in planting a crop.

Stabilization - ASA 90 Add On

The Ministry has for a number of years been involved in stabilization for a number of commodities. The program involves bulking up the federal ASA 90 program to ASA 95. The ASA 90 formula works out as follows.

5 Year National Average Market Price	=	A
5 Year National Average Cash Costs	=	B
Current National Average Cash Costs	=	C
Support Price	=	.9A + C - B

The Ontario support level is: .95A + C - B

The maximum Ontario payment is: .05A

Note the avoidance of basing the program on calculations of <u>total costs</u>. Determining cash costs is more straightforward.

Current Stabilization Effort

The current red meat stabilization programs (GM 95 for hogs, GM 50 for slaughter cattle, IMPA 85 for cow-calf) also avoid full cost calculations. In the case of hogs and slaughter cattle, cash costs are the basis of the trigger, while in the case of cow-calf, historic prices and inflation are used as the trigger. [Note, however, that "internal" analyses made prior to choosing a particular form for the plan did incorporate comparisons of full cost and market prices.]

Pricing

Milk is currently paid by a cost of production formula. This is not a direct Ministry program. If OMAF set the price, then OMAF would stand between conflicting wishes of the milk producers on one hand and consumers/processors on the other.

Nevertheless, OMAF does monitor the OMMB price relative to cost of production with a view to exercising moral suasion and undoubtedly had an (unpublicized) role in persuading the Board to move for price setting purposes from average cost of production to average cost of the better 70 percent.

Free Trade Studies

The Ministry is currently looking at the impact of potential free trade on agricultural commodities produced in Ontario.

The mode of analysis is - what are the expected prices under free trade for commodity X, what would be the cost of production and accordingly what are the implied rents? How do these rents compare to those presently earned and those available from alternative uses for the resources? By how much would output expand or contract under free trade, and what social pressures/benefits would be generated by free trade?

This same line of analysis will be employed in upcoming work on the national agricultural strategy.

General Health of Industry Studies

The general economic health of producers of a particular commodity may be analyzed by comparing COP with present and expected prices. This method of analysis is also used to determine whether a new (to Ontario) commodity can be profitably produced here.

Post Farm-Gate Studies

Whether a processing industry in Ontario is feasible depends in part upon at what price raw material can be supplied. COP studies can be used to determine the minimum supply price. Example - Ontario tomato paste industry. On the basis of COP the Ministry knew that farmers could supply at less than the negotiated price and on this basis in the interest of generating a past production industry was willing to persuade the Ontario Vegetable Growers' Marketing Board to temporarily reduce tomato prices for this fledgling industry.

Market Sharing

Canada's National Farm Products Marketing Agencies Act has provisions under which comparative advantage is to be taken into account in sharing growth in the market. COP data is required for this purpose. [Note, however, that given that prices are maintained above opportunity costs, provinces struggle to increase their share even for commodities for which they do not have comparative advantage. Thus COP has in reality a weak influence in this matter.]

Economic Development

The Ministry programs commonly have social/developmental goals which involve influencing producer plans by the design of the subsidy/tax regime. For example, the Ministry subsidizes installation of tile drainage via loans at favourable rates. The rationale for the subsidy is that costs of production will fall if the practice is introduced and/or the value of output will rise by more than the increase in aggregate costs. This conclusion requires knowledge of cost of production and in fact may require comparison of apples and oranges, since the crop rotation may be different on land that is drained (corn substituting for barley, for example).

The commonsense approach would seem to be that the producers will drain the land if it pays. But risk aversion and uncertainty are cited as reasons for producers making sub-optimal investments. It is, therefore, argued that subsidies do not promote economically inefficient resource use but simply involve transfer payments needed to bring about an economically justified level of investment.

Cost of production knowledge can be used to test this premise.

SUMMARY

1. Cost of production findings are open to doubt and dispute.

2. The high expenses of generating cost of production data, combined with the controversial nature of the findings, gives cost of production studies low sex appeal. COP workers can expect to receive the same level of acclaim society accords accountants.

3. Ministry programs are not tied to cost of production findings too closely because of their controversial nature and because demand as well as supply considerations are deemed to be important.

4. Knowledge of the cost of production (full cost, opportunity cost, comparative cost) is required in many applications. The type of cost of production cost data needed varies from application to application. Cooperation and collaboration are required between the generator and user of the data to ensure that studies are properly designed and results correctly interpreted. Studies should be designed to provide for flexibility in use.

5. Economic efficiency is only one element in social decision making. Political realities also exist. Decisions are commonly taken despite, rather than because, of conclusions derived from COP findings.

IMPLICATIONS OF COP IN GOVERNMENT POLICY AND PROGRAMS

FEDERAL PROGRAMS

MAX COLWELL

Agriculture Canada uses cost of production data both directly and indirectly in many of its programs. We have already heard some aspects of those interests from the Farm Credit Corporation speaker, Doug Lane, earlier. Some of the potential uses in tripartite stabilization activities were covered by Martin Jaeger.

I would like to concentrate my comments primarily on three existing uses of cost of production (COP). First of all, the uses within stabilization programs. Secondly, COP uses within supply-management programs, and thirdly, its uses within research and technology programs, (bearing in mind that Agriculture Canada, at our reckoning, does about 50 percent or more of this research in Canada).

I should point out firstly and very importantly that as a department we often rely on data collected elsewhere. We are not tremendous collectors of data ourselves. As a result, we rely to a large extent on the cost of production figures put together by provincial ministries such as the Ontario Ministry of Agriculture and Food.

Before getting into any detail on how we use cost of production, it is important to realize that there are many types of cost of production and it is also important to realize why this has occurred. The different types of COP have occurred because of at least four basic reasons.

1. There is a wide variation in the types of cost of production which could be calculated. These types may vary from COP calculated on the basis of average costs or marginal costs as Martin Jaeger pointed out earlier. Additionally, costs may be calculated for a sub-set of producers such as large and small size producers.

2. There is substantial farm to farm variability in the cost of production for the same commodity. One only has to look at the University of Guelph and Ontario Ministry of Agriculture and Food Farm Management Surveys and compare the results for the top third with the average producers for almost any of the commodities and one can see the substantial variability between these results. This variability is caused by such things as the size of operation, the method of production or the technology, and the management practices.

3. The cost of production calculated depends on factors which are included in these calculations. Various costs of production estimates can be included, for example, in variable input costs, fixed input costs, or returns to resources. The type of cost of production one acquires, therefore, depends on the items included or excluded from the calculations.

4. There are various cost estimation approaches mentioned. These approaches may include farm level surveys and the synthesis of representative budgets

based on existing farm level data as well as extension recommendations and published inputs. Finally, frequently price indices are used in updating existing surveys or budgets.

I think it is important to realize that the selection of the specific cost of production, its cost elements and the cost estimation procedures, depends on a number of factors. These factors include: what you are using COP for; secondly, the degree of accuracy required; thirdly, the availability of data; and finally, the cost and feasibility of collecting additional data. Frequently, more data is desired, however, time and finance are often two limiting constraints.

Now, I would like to move on to the three federal areas which I had mentioned that I would discuss. The object of the stabilization program will first be outlined and then an indication of some of the information needs and the information sources will be given. To initiate this discussion, let us look at the Western Grain Stabilization Act (WGSA).

The objective of the WGSA program is to help protect grain farmers from variation of returns due to unforeseen short-term market fluctuations and/or changes in production costs. This is to be done by assuring that the current year's aggregate net cash flow will not be less than the average of the previous five years. The information needs from the data point of view are the actual cash expenditures during the calendar year, primarily for the variable inputs. We have been pretty fortunate in this program to be able to collect the data that is needed from a yearly statistical survey known as the National Farm Survey. This survey covers cash costs and is conducted by Statistics Canada.

Secondly, the next program in the area of stabilization is the Agricultural Stabilization Act (ASA) and this relates to some of the comments that Martin Jaeger made. The objectives of the 1975 ASA amendment are to stabilize the effect of farm gate prices of agricultural commodities or products. Secondly, to assist farmers in realizing fair returns to their labour investment. Thirdly, to maintain a fair relationship between prices received by farmers and the cost of the goods and services they purchase in support of their production activities. Fourthly, to ensure that farmers obtain a fair share of the national income. This is accomplished by making a deficiency payment for named commodities in any year when the prices are below a minimum floor price that is not less than 90 percent of the previous five years' market price adjusted for changes in cash production costs.

The information needed for this program are the cash costs which correspond to the purchase of inputs used for the production of a specific commodity and these fall within three classes. These classes are direct cash costs, indirect cash costs, and some joint cash costs. The approach in this program has been to develop a base cost model that attempts to measure the national average cost for a particular year and then index that cost on a regular basis. The data sources generally used have been existing data such as the provincial cost of production data extension recommendations and engineering studies supplemented by expert opinion to reach an expert consensus budget. The indexing is done using the Farm Input Price Indices developed from Statistics Canada. I would point out that the group within the division of which I am currently in charge has been heavily involved in the development of these cost models over time.

Given the time limitations, I would like to move on now to supply management. In the supply-management area the objective has been generally to establish prices for the products. This has been accomplished through the development of full cost estimates which have included the variable input costs, fixed input costs, returns to resources - frequently including land, labour and management equity capital. The information needs and approaches differs among commodities. The feather industry (eggs, chicken and turkey) supervised under the National Farm Products Marketing Council, has used a survey approach in which data on required costs items has been updated periodically.

For industrial milk, which is administered by the Canadian Dairy Commission, a formula is used for price determination which includes a 45 percent weighting allocated to a price index, computed from 13 cost of production component items. This cost of production is then indexed and adjusted quarterly.

Finally, I would like to move on to the research and technology programs. These are interesting in and of themselves, but they are also interesting from the point of view that research and technology programs generally need a different type of information as compared to other programs. Much of the interest in using cost of production information in research and technology programs is for a number of objectives. First of all, to assist with priority setting and research, prior to investing resources. In this endeavour, the major concern is the potential impact of undertaking successful research in one area as opposed to another. This type of analysis seems to be increasingly important to our research managers in an era of constrained budgets.

Secondly, is the area of program evaluation. Frequently, central agencies in the federal government require or request evaluations of programs to examine their economic benefits. Research programs are no exception to this process of evaluating. Frequently in developing these evaluations, it is necessary to account for the impact of the research and technology transfer on specific sectors. In this area of general research and technology, cost of production information is also used in the area of technology transfer.

Cost of production is used in the technology transfer area, firstly, for looking at the impact of emerging technologies on the sector. The information needs in the areas of research and technology transfer are significantly different. In technology transfer areas, we need information on the costs by different sizes of farms, by different production processes, as well as information on the impact of changing technology on farm cost structures.

I would just like to finish up by thanking you for inviting me here and I recognize the expense of developing cost data is not small. Consequently, it is unlikely that any individual group here can develop all the cost information needed. It is hoped that this meeting has facilitated a better recognition of the most important components of cost of production information that should be collected.

COP IMPLICATIONS FOR MARKETING BOARDS AND PRODUCER GROUPS

THE ROLE OF COST OF PRODUCTION IN DETERMINING THE FARM-GATE PRICE OF MILK IN ONTARIO

PETER GOULD

Introduction

In reference to pricing, the farm-gate prices set by marketing boards are often synonymous with cost of production. This is not a very accurate portrayal. Cost of production, as I'm sure will become increasingly evident throughout the course of the seminar, is very elusive to define. Anyone who thinks there is something uniquely identifiable as "the cost of production" is mistaken. Cost of production can be estimated or measured in a variety of ways, including hypothetical estimates, model farms, the supervised collection of actual farm data and just about everything in between.

It is also worth noting that, at least in fluid milk pricing in the province of Ontario, cost of production (COP) and price are not one and the same. COP is an input, albeit an important one, in the pricing process. Similarly, COP is an input in industrial milk pricing, but its role, at the present time, is very different than in the fluid formula.

Fluid milk price determination is a provincial jurisdiction ano no two provinces do it exactly the same way. By the same token, different supply managed commodities take different approaches to pricing. The purpose of this presentation is to use the OMMB's approach to fluid milk pricing to discuss the role of COP in the pricing process, identify some of the issues and problems, and perhaps identify some longer term implications for the use of COP data.

The Pricing Process

It is true that the OMMB sets the farm-gate price of milk. However, this is a pricing decision probably not too dissimilar to the pricing decisions many other firms might take. In arriving at its decisions, the Board takes into account relative changes in an economic formula (e.g. "fluid pricing formula"), conditions in the marketplace vis-a-vis fluid sales, general economic conditions and any other relevant factors. In arriving at a judgement, the Board has to be mindful of fulfilling its long-term objectives[1] of: allowing efficient producers to earn fair returns for labour, management and capital; maintaining stability in the supply and price of milk and dairy products; and promoting efficiency in production so that milk can stay competitive with other beverages and food.

There is no question that the economic formula plays an important role in the pricing process. The distinction between an economic formula and cost of production is that the formula incorporates other measures. The fluid formula

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1 The objectives have been abridged.

uses cost of production "derived" data as its base and four factors to index the base forward to the current period or to project future periods. Cash costs (35%) are based mainly on Statistics Canada Farm Input Price Indices. The Average Weekly Earnings (20%) component measures changes in consumers' ability to pay and is based on the industrial composite wage for Ontario. General economic trends are reflected by the Industry Selling Price Index (30%) and a fluid sales demand factor accounts for the remaining 15 percent of the indexing portion of the formula.

The fluid formula, as previously indicated, uses a COP base. The raw data comes from the Ontario Dairy Farm Accounting Project (ODFAP)[1]. It is important to distinguish between ODFAP, COP and the fluid formula. ODFAP is a highly structured project which collects data from approximately 150 randomly selected dairy farms in Ontario. ODFAP offers the consistent, supervised collection of roughly 1,400 input variables (per farm).

The availability of the data allows users, including the OMMB, to estimate the cost of producing milk. In developing a cost of production base, a number of decisions and judgements have to be made. The purpose is to generate values which are reasonable and as representative of the "true" cost of production as is possible. The Board must be cognizant of the defensibility of its numbers to the public at large and producers. However, in doing so it creates a unique set of parameters which result in something called the cost of production. Changing any one assumption or judgement would result in an entirely different COP. Some of main judgements made by the OMMB follow.

The cost of production base used in the fluid formula excludes the value of assets associated with the farm house or quota. It also determines owner's equity at acquisition cost less accumulated depreciation. The return to owner's equity is based on FCC rates adjusted for interest rebates arising out of government programs. Labour returns are based on industrial composite wage rates for Ontario and there is an allowance of 5 percent for a management fee.

After all of this is calculated, only the 75 percent most efficient producers -- efficiency based on cost of production -- are used for determining the base value in the formula.

It should also be mentioned that two years' data is used in the base. This is done to smooth out the volatility that may arise by just looking at one year's data.

The cost of production used in the base is in fact the average of the cost of production calculated for each of the 150 farms in the sample. How these costs are used is also not without significance. Theoretically, if the simple average of costs was taken for all farms, one would expect that roughly half of the producers would have costs above the average and the other half would be below. In fact, 58 percent of the 1984 ODFAP participants had COP's below the "simple" average. However, for formula purposes the Board has always used the weighted average cost. Higher volume producers tend to be lower cost producers and on a weighted average cost basis only 44 percent of the producers had cost of production below

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1 More detail on ODFAP will be given this afternoon.

the average in 1984. Two years ago, the OMMB incorporated an efficiency adjustment factor into its base calculation. That is, only the 75 percent most efficient producers from the sample are retained for the purpose of calculating the base. On this basis, only 35 percent of the producers surveyed in 1984 had production costs less than the figure used in the fluid formula base.

Two things should be evident from the preceding comments. The first is that cost of production is far from a simple notion. The second point is that the Board is keenly aware of its responsibilities in the pricing area. It cannot set the price at a level that compensates inefficient and high cost producers. Its mandate is to provide fair returns for efficient producers and it does that by using both the weighted average cost and an explicit efficiency adjustment factor.

The efficiency adjustment factor is an important concept. At a time when technological and biotechnological advances "may" lead to a sudden and significant downward shift in the supply curve, an efficiency adjustment factor is a mechanism that can reflect those changes in the pricing process. In effect, the pricing policy forces producers to adopt more efficient production technologies or become the "rationalized" in the continuous process of rationalization.

Having accurate, up-to-date, and detailed farm accounting data provides an important window to the industry. Very quickly, one can tell in which direction the industry is going and it provides the data necessary for analysis relating to policy questions.

While important for an organization such as the OMMB, this "window" has important implications for other organizations, such as government, and particularly their policies regarding financial assistance. In this regard, the Board is fortunate to have partners in ODFAP representing two levels of government and the University of Guelph. The costs of the project are shared by all parties and all have use of the data. This helps ensure that rigorous procedures are followed and the collection of the data is not biased by the interests of the OMMB.

Some Issues Relating to COP

Time does not permit going into any detail on the many "topical" areas relating to COP. However, it would be remiss not to identify some of the areas that are contentious regardless of commodity. Three areas that come to mind are allocation of costs, returns to labour and returns to equity.

The allocation problem relates to multi-enterprise aspects, overhead items, personal effects such as the house and in the case of dairy, costs associated with quota. The allocation of costs is based on reasonable methods, consistent application thereof and the whole procedure is regularly subjected to the scrutiny of an independent technical committee. All costs associated with quota, including capital and interest are excluded.

The areas of returns to labour and management can be debated at length, but I'll deal with them in one sentence. The Board tends to use conservative estimates using series or measures which are in the public domain and easily defensible.

The above sentiment underscores the great value of having reliable farm accounting data. The cost of production information developed by the OMMB is derived from data that has the following characteristics:

1. It is a random, representative sample;

2. The data collection is supervised by trained full-time technicians;

3. The data is updated annually; and

4. Methods and procedures are reviewed regularly by experts representing the university, government and the OMMB.

None of these aspects should be overlooked when considering the value of ODFAP or other undertakings of a similar nature. Methods for determining the cost of production for agricultural commodities have not been perfected. However, the pursuit of consistency, comparability and accuracy should be objectives of all costing exercises.

Conclusion

While the Board has the legislated authority to set the farm-gate price it has an objective of expanding sales. It is also accountable to the public for its activities. In setting the price of milk (fluid), the Board tries to consider as many factors as possible. The fluid formula is without question a major consideration in the deliberation. I think it would be safe to state categorically that the Board has felt more confident that it has fulfilled its mandate to both producers and consumers since reliable farm accounting data became available with the inception of ODFAP in 1976.

COP IMPLICATIONS FOR MARKETING BOARDS AND PRODUCER GROUPS

COP IMPLICATIONS ON PRICING NEGOTIATIONS

G. ALAN FISHER

I am sure that I could start a lively argument among the group gathered here by presenting an estimate for the cost of producing an agricultural commodity. Why this difference of opinion? This difference occurs due to the different needs, with these differences varying among individual marketing boards and producer groups. Often, a marketing board has more than one need depending on which aspect of its mandate is being pursued.

What are some of the needs for cost of production data?

1. To guide them in their negotiations over terms and conditions of sale, including the price to the producer of the regulated commodity.

2. To be able to set the price paid to the producer so that the commodity will move into the market under a predicted supply and demand situation.

3. To publish newsletters, convene meetings, to make producers aware of market conditions, technological changes, and costs of production.

4. To be aware of COP as used by governments in policy decisions and related matters, such as stabilization, tariff and trade discussions.

"The opportunity to negotiate prices in an orderly and intelligent manner actually promotes a better understanding of the economic forces involved. It results in more consideration of the real needs of the market than is possible under the old individual catch-as-catch-can judgements dictating the course of the market", stated by G.F. Perkin in "Marketing Milestones in Ontario, 1935-1960".

To assist in a better understanding of the economic forces, "The Hon. T.L. Kennedy established the Farm Economics Branch in 1948 to assist the Department in assembling and distributing information based on how farms operate and the effect of methods used on costs and returns", as stated in the annual report of the Ontario Department of Agriculture for 1948. In its final year of operation, the Branch studied production costs for potatoes, and the canning crops of sweet corn, peas and tomatoes.

Over the years, all major Ontario crops have been studied. As well, production costs for red meat production have been prepared. I believe that these production costs reports have made producers, marketing boards and industry representatives all more aware of the cost-price relationships for most commodities. While the goals of each of these groups may be confined to their own narrowly defined purposes, the negotiation process has prevailed.

Marketing board negotiators have in recent years found themselves in the middle, faced by their producers on one side, who feel "that increased prices will solve their problems", and by industry representatives, who feel the increasing pressure from the competitiveness of world trade.

I have heard for many years that we need a price that will cover the costs of production for a particular commodity. My question firstly is, "whose cost of production?" and secondly, "what procedures will be used in calculating that cost of production?" I am sure that all the ways of determining production costs are correct, but for a specific purpose. Cost of production figures are used, and misused by many individuals for many reasons. In order for these figures to be accepted for a particular purpose, all methods and procedures must be clearly defined with the end use always at the forefront. This has always been a hang-up in price negotiations and has been increasingly so in recent years as the "belt tightens" on all parties concerned in the pricing of a commodity.

What are some of these hang-ups that have over the years caused so many lively discussions?

1. How do you value land?

2. What value do you put on labour supplied by the operator and unpaid family members?

3. What method do you use in allocating those many joint costs and farm overhead items that occur?

4. What about determining which of the cost inputs are variable (operating, cash) and which ones are fixed (non-operating, non- cash)?

Cost of production is becoming a more important part of our agricultural economic sector. Demands for more and better data are growing for: policy decisions, stabilization calculations, free trade discussions and, last but not least, more realistic COP for price negotiations that are acceptable to all parties.

What can be done to assure an improvement in COP information? All marketing board and producer groups represented here present a good potential for a source of input information required to assure accuracy in the preparation of COP data. Your organizations represent a cross section of Ontario agriculture whose members could form the nucleus of a cost information source.

While we certainly won't solve all the problems or determine the best approach, or the methods to use, I trust that we will all leave today with a better understanding of what COP is and what it can do for our organization or purpose.

COP IMPLICATIONS FOR MARKETING BOARDS AND PRODUCER GROUPS

PRICE TAKERS OR MARKET-ORIENTED

GRAEME W. HEDLEY

I want to start out by saying that I do not like the word or the terminology "price takers". I far prefer the terminology market-oriented. The word or the terminology "price takers" probably has some application. In my view, it applies to the individual who does not know his costs, has low productivity, and has no desire to change. This situation I do not think applies just in the market-oriented sector, I suspect it applies across all sectors. As a result, I prefer the terminology market-oriented.

Just so we do not all take ourselves too seriously, I would like to describe theoretical cost of production models as a spectator sport. I have been involved over the last 15-16 years in this spectator sport, both in our sector doing theoretical cost of production models in the cow-calf sector and in the beef lot sector. I know that sitting down with cow-calf producers to put together a cost of production model, the one thing that we can prove for sure is that there has never been any profit in the cow-calf business, even when the industry was expanding.

The cow-calf sector is part of the beef industry, this industry in general, has not responded to what you might call rational economic stimuli. In the beef lot sector, I have been involved with Ministry staff for years putting together cost of production figures with a view of setting out guidelines as to how much they can pay for stocker cattle. The only thing that has proven to us (or to me) is that they can pay more than what is generally indicated.

However, having said that about theoretical cost of production models and it being a spectator sport, let me say that individual cost of production figures are vital to the survival in the market-oriented sector - extremely vital. It's absolutely necessary for anybody that is going to use risk management techniques, whether that be forward contracting, use of the commodities market, either in futures contracts or in options. Specifically, producers must know their costs to know what returns are being locked in.

Individual production costs as a result, are extremely vital. The work that is done by the Ministry and the University of Guelph in the Farm Management Analysis Project is extremely useful in our sector. It allows an individual to make comparisons of his own operation to the industry at large. Is he in the top or in the bottom? And on specific items, is he above or below, or can he improve?

Cost of production figures, certainly in the last 10 years have become more used. Particularly, the cash costs are used in stabilization programs, both in the ASA amendments of 1975 that allowed cost indexing, and in new tripartite stabilization programs where there is a cost of production section and cash cost section (as Martin Jaeger described). Monitoring those costs to try to reach some sense of rationality, and on a weighted basis across Canada, is vital to stabilization programs.

NOTES FOR DISCUSSION

Theoretical cost of production formulas for market oriented commodities can be best described as a "spectator sport".

1. "I get to watch it and it may depress me or it may exhilarate me but for sure I am doing it from the sidelines".

2. Perhaps that comment seems facetious, but it is reality for market oriented commodities.

3. What is vitally important for producers in market oriented commodities is knowing individual production costs.

4. There are various mechanisms to cope with price risk from strategies which concentrate on cash market price averaging to use of forward contracts, commodity futures contracts and option contracts.

5. Any strategy using the commodity market demands intimate knowledge of individual production costs.

6. Notwithstanding the comments above about "spectator sport", the analysis of production records such as is done in the Ontario Farm Management Analysis Project serves a number of very useful functions to the market oriented industry:

    - Allows comparison of an individual's production costs to the industry average and helps identify cost weaknesses.

    - Provides a basis for establishing specified costs now used increasingly in stabilization programs.

COP IMPLICATIONS FOR MARKETING BOARDS AND PRODUCER GROUPS

COP IMPLICATIONS: OVERVIEW

J. SANDEVER

Philosophical Arguments

Price Taker :	Beef, Pork, Grains
Price Setter:	Poultry, Dairy, Tender Fruit
Price Negotiator:	Vegetables, Tobacco, Grapes

What about market response to cost of production pricing versus free market price discovery?

How does a commodity group or board maximize volume to be sold and the returns generated?

Theorems

There is a vast array of economic principles to consider, such as:

Supply Side Economics
Demand Oriented Economics
Econometric and Market Analysis
Perfect Competition vs. Monopoly

Empirical Consideration

What costs should be included in a COP formulae?

How is the formula generated?
Should it be a cost formula (supply)
Or a price equation (demand)
Or is there a mid-point (demand-supply link)?

What demand factors, among others should be considered when price is established?

The need for a good database and an up-to-date market information system for any one of these three price determination methods is essential.

Administrative Factors

How do you change the COP formula to reflect different conditions within the marketing environment?

What should be the methodology used for updating the COP formula?

Should there be specific, narrowly defined, or broad general guidelines to follow for national and/or provincial pricing?

How often should the guidelines, or ground rules for conciliation and binding arbitration be reviewed and revised, if deemed necessary?

Should the style of negotiations be changed from time to time?

What other economic or market related factors should be incorporated into the negotiating system?

Issues

How do you ensure that quota values do not enter the COP formula?

What comparative rates from industry and other sectors of the economy should be included in the cost formula categories, e.g. labour wage rates?

How do you separate economic and accounting costs within the formula or equation? For example, what ROI should be used, IF ALLOWED; what is the opportunity cost?

How does one account for capitalization factors as it relates to quota transfer policies?

Should we try to compete with interprovincial and international competitors, OR do we look at it solely from a provincial perspective and thus, set our pricing policy strategies accordingly? e.g. processed vegetables from Quebec and the U.S. into Ontario or Ontario exporting abroad.

The price appeal function is a safeguard built into the marketing board system should someone be aggrieved with the price established by the commodity board. (It should be noted that in the case of turkey and chicken, the commodity board discusses market conditions with processors, sets a price, advises the processor and may then revise it after hearing specific concerns addressed by the processors.)

Government Involvement

What are the supervisory responsibilities of the FPMB and/or the government?

The legislation is available to those who seek it and are willing to assume responsibilities associated with these marketing powers when used by the commodity group.

How does the government deal with quota values?

Is there another alternative to COP pricing -- i.e. is there a substitution for it?

What level of involvement should the government supervisory board assume in negotiations and arbitration? What assistance should be provided during the negotiating period?

Should the government approve and monitor all COP formulas and pricing decisions? Where do you draw the line between supervision and the responsibility for exercising the marketing powers delegated to the commodity board?

USE OF COP IN EXTENSION AND FARM MANAGEMENT

ART LAWSON

We are in a time of fairly pessimistic attitude. Representing some of the people in the trenches, I can tell you that it is not a real happy time, particularly if you are trying to preach cost of production, and management efficiency to agricultural producers.

As many of the speakers have said this morning, cost of production is a name that means a lot of things to different people. If you are Andy Bunn, Al Fisher or Rob Lindsay, you mention cost of production and immediately a number of things come to mind. You know your terms of reference and the items you are trying to incorporate in your model or study. The problem that I and many of the field staff are faced with is that the people we deal with are really not generally equipped with good enough records to define their cost of production. There is a big variation in the records. We are faced with mixed and integrated operations and enterprises that make it hard to narrow down cost of production. For example, a farrow to finish operation may be integrated with the crop enterprise, causing it to be difficult to determine the cost of the farrow to finish operation. Many times the producer has a price for hogs in mind but has overlooked some of the indirect costs associated with the enterprise.

The thing to know is that farmers basically do not like economics. They have an intense aversion to economics. There are studies I believe that support this option. A survey conducted by Charlie MacGregor, a number of years ago, acquired information on farmers' general level of expertise in economics. I think the results showed that less than one in five people do budgets. As illustrated, we are generally talking to people who really are not accustomed to doing budgets or in general, economic analysis. As a result, it is a problem of how to get budgeting to be interesting to producers and how to get their attention. Specifically, how does one and make producers think and calculate in terms of production costs? Opportunities sometimes arise at land rental time, for example, when producers are interested in land rental costs. At speaking engagements on these topics one can often work in discussions on budgets. These discussions, however, frequently would make economists cringe a little when noting what the field staff do with surveys or cost information. However, this is really just a way of getting the farmer's attention when they are vulnerable.

Gimmicks tend to be used to get farmers attention about economics and business management. We often end up mixing economics in with other topics. For example, at demonstrations where you can bring people out to see how an operation is done, a little bit of economics can be mixed in - it is usually more palatable that way.

Table 1 shows a study that was done in Perth County, actually this was a yield competition. Ken McEwen and John Heard put this study together and it was sold initially as a high-yield competition for corn. Information, however, was also collected on participating producers, technology used in crop production and including the direct cost per bushel for the crop. Again, the economists might cringe a little because we haven't included the fixed costs in this analysis or looked at the whole system or whether these farmers are making money in the long run. At least, however, it is a way of initiating consideration amongst

farmers on cost of production. For even with this initial bit of information, producers do become more aware of the importance of cost of production in analyzing their operations.

In Figure 1, a cobweb is shown. The first cobweb I saw in Ontario was from Bill Grexton in Wellington County. Since that time, a number of the other Agricultural Representatives and Farm Management Specialists are using cobwebs for enterprises. The one shown in figure 1 is for a dairy operation. There are others for cash crops and for swine operations.

There is a reference in the Pursuit of Excellence, which many of you may have read, to the steel mill where productivity was a real problem and they were losing money. One day, a shift manager wrote a number on the floor where the workers came in. The workers coming in on the next shift saw the number and assumed it was some kind of challenge or the number of tons that the previous shift had produced. As a result, they went out and produced a tremendous amount more than the previous shift. When they completed their shift, they wrote the production level down on the floor. These simple gestures were the beginning of a competition and increased productivity. Similarly, farmers' data can be used to cause them to compare their numbers with a relevant group of farmers, thereby increasing their awareness of other farmers' accomplishments and enhancing competition. These activities likewise can improve the productivity and the profitability of farmers.

An approach to increasing awareness of relevant groups' data in Perth County, for example, uses information from the farm management analysis project, and puts it in a cobweb. Productivity and profitability indicators are represented on the cobweb through the use of lines or bars radiating from the centre. On this bar, the average performance of the group is indicated. This approach uses a farmer's data but then returns relevant information back to him afterwards. I think it is this two way street in farm management as Al Fisher suggested earlier. Other sets of data and information used are "Pork News and Views". It is a good base plan that a lot of pork producers use. The problem in using such a data source, however, is that most producers think that they are typical. I think, as a result, farmers generally say, "I am average and the numbers Andy Bunn produces are average too", but farmers are not always the typical or the average case.

Andy Bunn's figures tend to represent better than the average of producers. The farming population is made up of a wide range of producers in terms of productivity and performance. However, it is often hard to convince farmers that they are not quite as good as what they consider the typical or the average. This consideration is really a problem in dealing with individuals.

Cobwebs are sometimes used just to provide basic information on the average for the group (figure 1). The area of micro-computers, however, is a growing one and we are increasingly moving in that direction. At the top, farmer workshops, farmers were given computer model demonstrations. However, these farmers tend to be a fairly elite group of people - I think there are only 45 farmers in about 12 counties that were involved. You can see, therefore, that it is a small number of farmers that really have the scale and the information available to them to make use of this computer technology.

We are really up against a big problem here. The information that is available to counsellors ranges all the way from the most sophisticated computer models, to something that is not a very good shoe box record keeping system. Additionally, it is difficult to put together data or a seminar that will attract a farmer and also provide valuable information. I think, the climate however is improving and perhaps today we can get some more suggestions to enhance extension and farm management diffusion across to farmers.

NOTES ON USE OF COST OF PRODUCTION IN EXTENSION AND FARM MANAGEMENT

"Cost of Production" is a term that can mean different things to different people. How often have you heard some one say, "All I really want is to be paid for my cost of production?".

Roughly translated that may mean the person wants $4.50 per bushel for his corn, $90.00 per acre for his soybeans or $85.00 per cwt. for his pork. These prices may be what is needed to cover all costs and cover living withdrawals (Appendix 1).

The challenge in extension and farm management is to help a clientele that is generally not oriented to record keeping. "Cost of production" is pretty abstract to a producer who may not understand his overall financial situation. There may be several enterprises involved and costs not easily allocated to one or another.

Extension Thrusts

In my opinion we (extension workers) need to take a fairly simple approach. Try to identify issues or questions that may be on our clients' minds.

For example, land rental arrangements are often renewed in the fall. Timely press articles or meeting presentations can show the impact of land rental on total cost and net returns. We have a chance to "grab" a farmer with an issue that's on his mind.

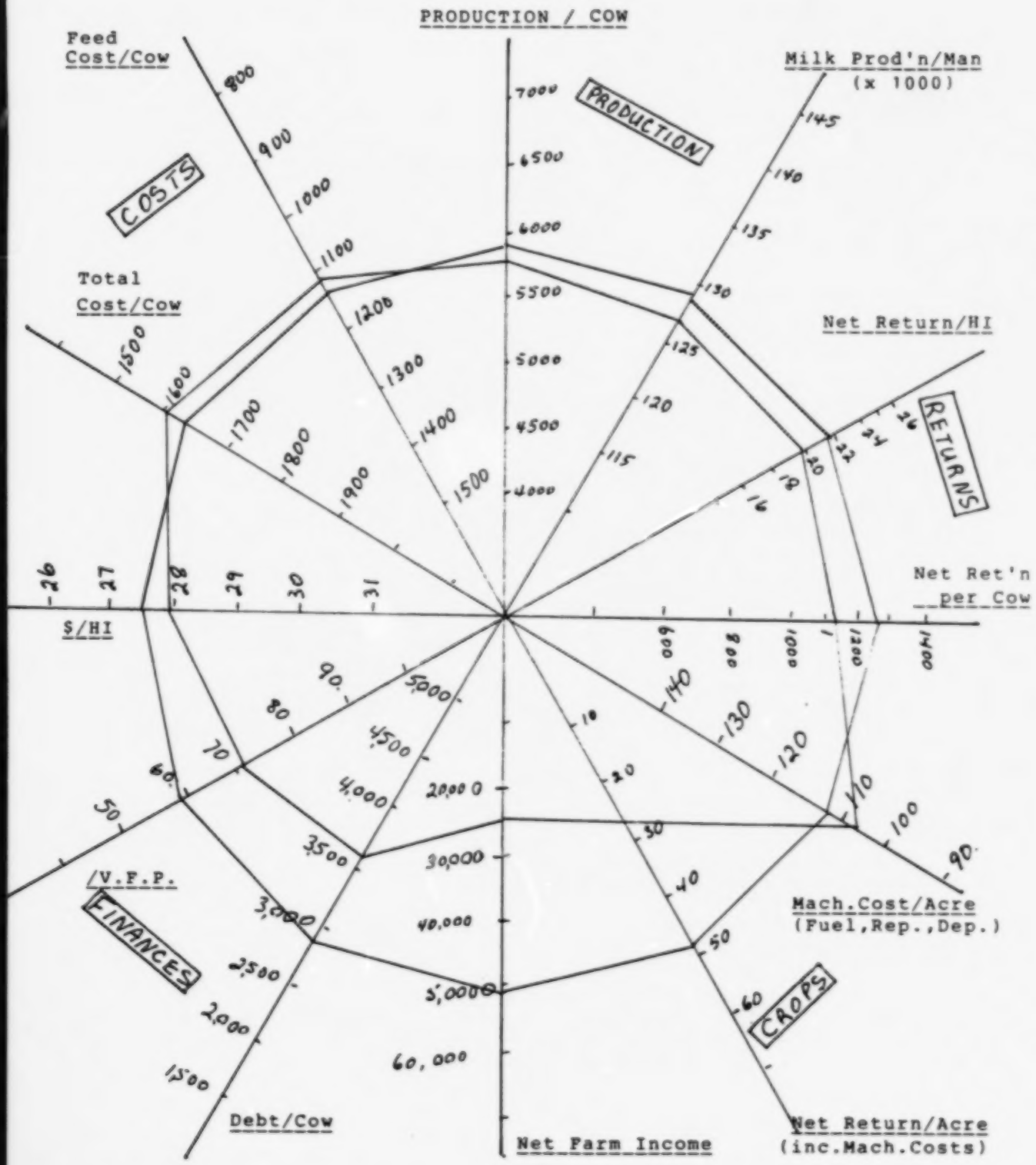
Land rental may be just one part of "cost of production" but to many producers it's a major part. The aim is to make him look at what he's doing and what he can do to control costs. How much can he afford to pay for land?

Talking economics to a farmer can be like getting him to take medicine. It may be more palatable if mixed with something else. For example, crop yield and technology may really "turn his crank". In Perth County, high yield competition results were related to production recipes and the direct costs per bushel calculated. It is an effective illustration of the effect of crop sequence and production recipes on yield and cost per bushel (Table 1).

Packaging the Product

Sometimes it's not what you say, but how you say it. Many Agricultural Representatives and Farm Management Specialists are starting to arrange the results of the Farm Management Analysis Project into "cobwebs". The dairy cobweb prepared by Bill Grexton is a good example (figure 1).

Figure 1: DAIRY COBWEB



Graphics can illustrate what other farmers are doing and challenge a producer to measure his performance against others. The combination of production and financial information in the cobweb is an effective way to illustrate the interrelationship of production and financial management.

Individual Counselling

Part of the farm management extension thrust is one-on-one counselling. Changes and adjustments in some businesses often require some points of reference to evaluate decisions.

In the pork industry, "Pork News and Views" budgets are often used as a benchmark. The base plan tries to reflect a model of reasonable investment and performance. Default assumptions are used if the farmer doesn't have his own statistics available.

The advisor needs to use some discretion and not just accept default or "average" results without some attempt to adapt to the situation in question. Reliable statistics just are not available for most of our individual counselling situations.

As advisors we can't accept easy answers. There are as many "costs of production" as there are producers. The trick is to find the switch to turn a producer on to find and use his cost of production and use it in making informed management decisions.

Table 1: Perth Soil and Crop Improvement High Corn Yield Competition

Grower	Dybrid	Plant/acre	Previous Crop	Cost $ per bu.	Incl. Seed	Yield
1	Pioneer 3925	25,100	Corn	.84	1.04	127.12
2	Pioneer 3803	27,200	Winter Wheat	.90	1.08	148.96
3	Co-op 3703	26,000	Corn	.88	1.10	133.98
4	Pioneer 3925	26,000	Winter Wheat	.89	1.09	129.93
5	Pioneer 3950	25,000	Winter Wheat	.57	.75	138.91
6	Pioneer 3906	29,000	Corn	1.55	1.84	99.79
7	Pioneer 3803	28,000	Alfalfa	.51	.67	168.90
8	Pioneer 3906	32,000	Winter Wheat	.63	.86	141.71
9	Pioneer 3803	30,000	Winter Wheat	1.32	1.55	131.87
10	Pride 1169	24,200	Winter Wheat	.77	.95	135.19
11	Pioneer 3859	26,700	Corn	1.10	1.37	98.35
12	Pioneer 3906	28,000	Wheat	1.20	1.42	138.02
13	Pioneer 3906	28,000	Corn	1.07	1.26	150.15
14	Funk's G4141	28,000	Corn	.81	1.07	105.42
15	Pioneer 0000	20,000	Corn	1.27	1.49	127.76
16	Pioneer 3949	34,000	Corn	.96	1.30	99.70

* Costs to tillage, planting, nitrogen application, fertilizer and pesticide.

MODELS USED IN COP GENERATION

THE PHILOSOPHY OF COP MODELS IN THE PAST AS WELL AS NEW DEVELOPMENTS

SAYAD RIZVI

I would like to thank the people in this morning's session for making my task fairly easy because they said almost all of what I was supposed to say in my talk. This morning's session has given me a very good insight and a realization some of the basic problems in the cost of production work. These problems are that we have lots of studies in cost of production which have been conducted all across Canada, but we are lacking a consistent and a representative system which would allow us to a particular study that represents a specific area cost of production. Dr. Haslett this morning indicated that cost of production is a crucial concern of each producer or, in a broad sense, of each business man. Without cost of production analysis we cannot proceed in any kind of business enterprise.

In agriculture, cost of production work has taken several stages of development. In the area of farm cost records, for example, the stages of development stem from before the 1960's. More recently, in the 1970's, consensus farm management and cost information has been generated and national farm survey work has been done.

My experience in cost of production work is not very long, I just joined the Production Cost Unit at Agriculture Canada about seven months ago. Before that I was with the Program Evaluation Division in Agriculture Canada, where I evaluated three or four programs - mainly agricultural stabilization programs under the Agricultural Stabilization Act. At that post, I made an important realization that the cost of production data which we wanted to use for evaluating the stabilization programs was lacking. This was a big problem to surmount. As a result, we resorted to using various published cost studies. To our surprise, there was no consistent cost information available which we could use for evaluating the income stabilization program. Most of the cost studies were simply not in any way consistent. They are very good works, they have got very good and valuable basic information, but they lack information on cost of production - especially for a specific commodity.

This concern about consistency existed before I joined the Production Cost Unit, as you can see, but its importance is likely to grow as we proceed into various programs. These programs include, for example, tripartite stabilization programs, commodity-based development strategies and also the talks and the negotiations on free trade. For these programs, we will require information on cost of production, not only in a general way, but on specific commodity and specific enterprise basis. For that reason, there are a number of philosophical issues. These issues relate to judgement calls to make when collecting and tabulating cost of production information. For instance: what costs we have to consider? for whom are we collecting this cost information? for whose cost of production should we be concerned? what period ought to be covered? how are we going to allocate various cost items? and what various cost and input mix we are going to consider? In other words, these philosophical concerns are aimed at the relationship between cost of production data to be collected relative to cost information needed. These concerns are then superimposed on the other problems associated with model building and program evaluation.

The approach of cost models we use have been for agricultural programs in the area of stabilization, income stabilization and in the area of supply management programs. Most of these programs have their own models and they have their own formulae which they use for arriving at the income levels, support levels and product prices. The philosophical background of all these models and these formulae is evident in the mandate and in the act governing these programs. The main question of concern to us is, however, what system should we evolve and what mechanisms should we evolve so that we come up with consistent cost of production for various commodities across Canada? Currently we have many studies from provinces such as Alberta, Saskatchewan and Ontario (which has many). But what these cost studies represent or are based on is sometimes unknown. Whether they are commodity representative, regional representative or appropriate for certain types of analyses is often unclear.

The main need is to develop cost models or studies on a consistent basis which may be representative, which may be used for various purposes - namely - for policy making purposes, for bargaining between producers and processors, for price-setting purposes (as discussed this morning), for projecting future trends for government planning, for negotiating tariffs and for setting trade policy internationally and between provinces, and also assessing costs and benefits of development programs, and also for extension purposes. Therefore the biggest challenge in the cost of production area is to come up with a system or mechanism by which we may proceed - commodity by commodity, enterprise by enterprise in developing cost models.

These models must be flexible enough to facilitate easy updating when needed to meet different purposes. Another major challenge is the synthesis of linkages or systematization between existing COP models and the extent to which models currently being developed can be integrated into this network. The linkages referred to here must include the definition of terms. Are we talking of opportunity cost, average cost, marginal cost, cash cost, non-cash cost, total cost? All these challenges, questions, and decisions have to be sorted out before we can have cost models primed according to these outcomes.

For instance, the models being used for income stabilization programs at the federal level (the Income Stabilization Act) has a specific mandate and rationale. The model being used is suitable only for that particular Act. How that information we get for that particular Act can be used for other policy matters is a problem which must be solved. In solving this problem, and similar ones concerning the use of COP models, consistent and representative of the cost information generated must be of prime importance. Additionally, the flow of cost data for multiplexitive-purposes and end uses must be maintained whenever possible.

NOTES FOR THE PANEL DISCUSSION (COP MODELS)

1. Early developments in the area of Farm Record Maintenance and Cost of Production.

   - Farm Records in the early 1960's
   - CANFARM System in 1970's
   - Development of Consensus farm budgets in mid 1970's
   - The National Farm Survey
   - The CDC Survey
   - The Taxfiler Data
   - The FCC Survey
   - The Consensus Farm Budgets.

2. Need for the development of specific cost of production models for various income support programs and supply management schemes.

   - The Agricultural Stabilization Act (ASA Models)
   - The Western Grain Stabilization Act (WGSA Model)
   - The Agencies Act (COP Models used by CEMA, CCMA and CTMA).

3. - Cost of Production Models within the content of objectives and rationale for various Income Stabilization Programs and Supply Management Schemes.

4. The latest shift towards the Tripartite Income Stabilization Approach and the need for specific cost of production models.

5. Concluding Remarks.

THE PHILOSOPHY OF COP MODELS IN THE PAST AS WELL AS NEW DEVELOPMENTS

COMPUTER TECHNOLOGY AND COP

GARY LENTZ

In the early days of farming, extension workers, as well as farmers themselves, found that, aside from knowing how to produce commodities, it was important, and sometimes even critical, to know what the costs of production were. Cost accounting represents some of the first farm management effort that was done. Cornell University in New York was one of the colleges to recognize early on, the need for, and the importance of farm management and cost record keeping. Cornell developed in this area and became a "centre of excellence" for farm management work.

Of course since that time, virtually every college, university and government involved with agriculture has developed an interest in costs of producing basic commodities. Today, we will spend a fair amount of time talking about methods and models for handling costs. Let us examine methods for a few moments.

By and large, changes in the methods for handling costs of production parallel the development of technology that is applied to the area. Early workers used large record books and a lot of time devoted to carefully checking the entries and adding them up to arrive at final figures for the farm or enterprise under consideration. Later on, mechanical calculators relieved some of the drudgery and chance for error in computing the costs and returns. In the early 1950's the first generation of computers started to be applied to summarizing large samples of farm records. These records were either sent in to central offices by farmers or collected at the farm level by extension workers and farm management specialists. In Ontario, computers were first used for managing and summarizing the Dairy Herd Improvement records.

Economists soon recognized the possibility of using the new computer technology to analyze hundreds or even thousands of farm records. This possibility was accomplished as the Farm Management Analysis Project in Ontario was eventually transferred to computers from the clerks who used to spend hours labouring over a calculator and reams of paper. As computers grew more "user friendly" and powerful, the possibilities seemed almost endless. All of you here are probably familiar with the development of Canfarm as a national farm management accounting system. There is no room, nor is it appropriate, in this paper to go into the details of Canfarm. Suffice it to say this exercise represented a major effort in analyzing farm accounts on a broad basis and providing a data bank that could be used by researchers and government policy advisors in analyzing specific samples of farm types or enterprises.

While Canfarm may have met some needs in the industry for information, it did not meet them all. In particular, it utilized an accounting package that produced results acceptable to Revenue Canada for tax filing purposes. Marketing boards, government agencies, and other groups had a need for cost information. Canfarm met tax filing criteria but it was not necessarily useful for determining cost of production. Because of their specific needs, individual agencies still carry on their own cost work for their own reasons.

Computer Models

There are lots of computer models around that have been developed to summarize farm records. In fact, if the truth were known, we would probably find that there are at least as many computer models as there are agencies interested in costs, perhaps even more. I will discuss two models briefly that have received a lot of attention -- one in the United States and one in Canada.

Oklahoma Budget Generator

The Oklahoma budget generator was developed on mainframe computers and has several interesting features. Probably its greatest strength lies in its capability to store and retrieve individual sets of budget data, and its flexibility in handling all types of commodities (both crops and livestock). At this point I do not know if it has been adapted to run on microcomputers, likely it has. Most other state universities also have programs of one type or another for summarizing farm records. The need for most of these programs grew out of the farm management comparative analysis projects operated by extension farm management specialists. Nearly all universities in the United States either had or still do operate these projects mainly for the purpose of giving farm cooperators comparative statistics. In this way farmers can compare their own farm figures with averages and assess what their future course of action should be.

Alberta Agriculture

Alberta Agriculture has been very successful in developing a whole range of farm management analysis programs, both for microcomputers and mainframes. One program in the cost family is their CR Crop Budget Program. This program had its original basis in the Soil Conservation Service in Montana. It was adapted to Alberta conditions and situations. This program formed the basis for the ACRES program that Blair Campbell and I developed here at the Ministry.

Ontario Developments

There are a number of people who should be remembered in Ontario who have been deeply involved with cost of production work. One of the first to see the need for and the value of this type of work is Howard Patterson, who was the first director of the Economics Branch. He set up the Cost Section whose function was to collect data at the farm level and summarize it in such a way that it could be used for both individual farm management business decision making and farm planning as well as for public policy purposes. Many others have been involved over the years, some of whom are with us today. At the risk of omitting the names of some who I don't know, I'll not attempt to list all who have been involved with the Cost of Production Section in the Economics Branch.

I'll recount the events since I came on the scene in 1972. Prior to that a cost program had been written in PL/I for the purpose of analyzing and summarizing farm records recorded largely in the "blue farm account book". This program was difficult to use and did not always give the kind of breakdowns to the summaries that the researchers were interested in.

The program never saw much actual use. Its difficulty of use was coupled with the fact that the users were scattered from Chatham to Ottawa. This meant that data had to be shipped around, changes had to be made, and generally turnaround time was probably worse than doing the summaries by hand in the local office.

During the 1970's computer technology was being developed to a high degree. At the same time the need for cost data was growing, particularly for public policy purposes. As well, the costs of collecting the data were increasing at a time when manpower available to obtain it was decreasing. All of these factors pointed to the need to develop a system within the Economics Branch for handling cost of production data that would provide the desired results.

Development of the ACRES Model

Many changes were taking place in the government during the 1970's. One of these was a cutback in spending. This single development, along with the urgent need for an unbiased source of statistically valid cost of production information, spurred the development of a cost model in the Ministry of Agriculture and Food. The result of that effort is the ACRES program which will be demonstrated in the session tomorrow. But let me tell you a little about the development and assumptions that went into this model.

We feel that this computer model has several advantages. One of these is consistency. This means that two or more budgets may be compared because they have been computed using exactly the same methods. Also budgets may be compared over time because their methods of computation will be the same and differences in results will be brought about by changes in the data such as prices, interest rates, or changes in production technology such as accomplishment rates.

Another benefit of the ACRES model is standardization. No doubt all of you have observed that one institution may at times issue more than one budget or estimate of cost of production. Frequently the differences are brought about by divergent assumptions and methods used to calculate the budget. In reality the differences should be based on differences in regions, pricing or in time rather than on methodological differences. Through widespread use of the ACRES model the appearance of non-standard cost estimates can be reduced.

These benefits lead to the third important concept of the ACRES model - ease of use. It has now been converted from a mainframe application to a microcomputer. This will be demonstrated tomorrow. Now that microcomputers are so widespread, the ACRES program may be easily transferred from one computer to another and made available to users who wish to run the program. The program is flexible and particularly user friendly. If the user does not have the required detailed data available on machinery, default data can easily be used in running the model. The output is straightforward and easy to interpret.

Specific Approach

The model was written to provide for covering all costs of production. This includes a return to land, labour and management. These three areas have probably given users of cost information the most difficulty and controversy. The user may assign a value for land and buildings separately, an interest rate for

each, or a rental rate if owned resources are not appropriate. The values you put in for land are your own. If you wish this to be treated as a residual return, then a zero value may be entered. Similarly, a return to management may be left as a residual rather than entered at a percentage rate of the gross returns per acre.

Hired labour does not usually cause a problem in budgets. Operator labour is slightly more difficult. The ACRES model allows the user to enter up to nine separate classes of labour. This is sometimes useful in certain vegetable or tobacco crops when different kinds of labour are employed at different times during the growing season. Operator labour may be entered at a zero cost and treated as a residual.

Machinery is handled via a master machinery file that contains items such as a description, purchase price, age, hours of annual use, information on repair costs and fuel consumption for powered machines. There is no question that it takes considerable effort to construct the initial machinery file. Once this is done, however, it can be used in producing budgets on a wide variety of crops. Each machine is coded and when a budget is run, the implements used may be expressed in a way that simulates an actual farm operation. All the details for the use of the ACRES model are outlined in a report available from the Economics and Policy Coordination Branch (Rept. No. 84-04) and will be demonstrated tomorrow.

USDA Experience

A recent ERS staff report from the USDA by George Hoffman and Cole Gustafson in May 1983, indicated that there were perceived to be some conceptual problems with some of the approaches taken in traditional costs of production work especially in the USDA. This reassessment of the USDA's approach was prompted by the 1981 Agriculture and Food Act which gave the USDA greater flexibility in estimating production costs. The authors identified problem areas in costing land, management, and operator labour. For example, they noted that in the treatment of farmland, there must be a recognition of implied investment and non-cash returns flowing from land investments. Only those costs necessary for generating the current returns should be included in current costs. To help reduce the problem in separating out these costs, the USDA took another approach altogether. They now use a composite of cash and share rent as the land component in their cost of production estimates.

The problem of returns to operator inputs is handled by breaking the production costs into two parts: cash expenses and economic costs. In the economic cost section, land is treated as discussed above. Returns to all labour are based on surveys of machine time. Hired and operator labour is not broken down. The return to management and risk is treated as a residual.

Some Thoughts for the Future

Over the next 15 years, there will be a number of new technological developments in agriculture. Genetic engineering for both animals and plants will be high on the list. The general area is called biotechnology. Computers and electronics will also be used to increase management efficiency.

No doubt new policy approaches will be required to cope with imbalances in returns that develop in the industry or to provide assistance to certain groups. In most cases public policy initiatives need to be supported by data--often cost data. It is certain economists and policy advisors will be called upon to provide the necessary analysis. All indicators so far continue to point toward a continued need for cost of production information. Computer models will be instrumental in developing this information.

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THE PHILOSOPHY OF COP MODELS IN THE PAST AS WELL AS NEW DEVELOPMENTS

THE PHILOSOPHY UNDERLYING THE TOP MANAGEMENT MODEL

R.A. SCHONEY

Introduction

Farmers are data rich but information poor. There are tremendous amounts of research on the cellular functions of plants, but a paucity of economic and management information when it comes to assisting farmers in evaluating their past and planning for their future. This is in a time when it is crucial that farmers not only closely monitor their farm businesses, but also plan as far forward as possible. Yet, farmers and most agricultural professionals are little better prepared or equipped to meet these challenges than 20 years ago.

There is a long history of farm business data collection and decision aids (see A Survey of Agricultural Economic Literature, Vol 1, pp.3-89. 1977). Many states such as Illinois, Iowa, Wisconsin, and Pennsylvania developed hand and electronic record keeping systems. Perhaps, the most complete and most recognized integrated system of record keeping and decision aids was the CANFARM system which was later relinquished to private control. Jenson comments that there was little "success in formally tying record keeping to a forward planning process" (Ibid, p.28). This should not be surprising, however, as most farm record systems were designed with their primary goal as fulfilling income tax requirements. Farm data were not collected in a fashion consistent with modern decision making models. In general, data were aggregated and there was no meaningful way to establish the linkages between key farm decisions and results.

The Underlying Philosophy of the Top Management

The Top Management Model has evolved over time and after past modifications and the current reprogramming and development, little of the original program remains. Over time we have developed some techniques and an accompanying philosophy in whole farm planning. For convenience, these can be delineated into five categories:

1. Problem,
2. Data collection,
3. Input,
4. Model structure, and
5. Output.

The Problem

An excellent model for delineating the most crucial farm decisions was devised by extension farm management specialists at the Universities of Minnesota and Wisconsin in 1973. They proposed that three major questions are involved in evaluating a plan for achieving family and business goals[1]:

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1 Thomas, K.H., R.O. Hawkins, R.A. Luening and R.N. Weigle. Managing Your Financial Future. North Central Regional Publication 34. University of Wisconsin-Madison. (1973)pp7-8.

1. Where are we?
2. Where we want to be?
3. How do we best get there?

Traditionally, different tools and data were employed to address these problems. The first question requires historical farm business information; the second question generally uses capital budgeting tools, while the third method projects future cash flows.

The Top Management Model was constructed to address all three questions within the same model. Operationally, the Top Management Model has evolved into two phases. The first phase corresponds to the first question, while the second phase corresponds to the last two questions.

Phase I

The first phase consists of evaluating the farm business in terms of: 1) allocation of resources or cost efficiency; and 2) financial performance. Three types of diagnostics are used in evaluating cost efficiency: 1) machine use intensity; 2) machine system costs; and 3) enterprise profitability. In our workshops, we start with enterprise profitability and evaluate each income and cost component in terms of our performance benchmarks. We pay particular attention to machine and building fixed costs. Cost inefficiencies due to excessive capital recovery charges are usually generated by either sub-optimal replacement policies or oversizing. We can diagnose high machinery fixed costs and identify their underlying causes using peer benchmarks and the following procedure. Average annual fixed machine, equipment and building costs per acre for each enterprise are reviewed and compared against performance benchmarks. Excessive fixed costs are traced to the individual machine systems and their corresponding machines.

While machinery and investment per acre[1] could also be used to diagnose high machine fixed costs, there is real value to the farmer in being able to identify a particular machine or machines as being the fundamental root cause. In our experience, it is often easier for a farmer to deal with sub-optimal machine sizing and replacement policies if he can deal with specific machines rather than general investment guidelines. Thus, identifying the set of machines and buildings gives the farmer a concrete base where he can initiate problem solving procedures. Of course, an excessively high machinery cost may not necessarily be an economic problem. For example, a relatively low investment machine may be used very little, and, therefore, creating a high per unit cost. The problem may also be transitory, caused by extremely high first-year depreciation[2] by machines such as a large, self-propelled combine.

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1 Machinery and building investments are assigned to each enterprise using the same allocation procedure as machinery fixed cost.

2 For a study an estimating actual depreciation or loss in machine values refer to Schoney and Finner and Schoney and Brown.

Phase II

In theory, the investment decision can be stated as simultaneously maximizing terminal net worth subject to cash flow and financial constraints. In working with farmers, the investment problem is decomposed into a two-step examination of economic profitability and financial feasibility. Long-run economic profitability is measured by changes in net worth and financial feasibility is determined by examining cash flows and changes in debt structure over time.

Operationally, the current situation is labelled as the "base run" and forms the benchmark of comparison for all other alternatives[1]. Subsequent alternatives are labelled as "trials" and any changes to the base data are stored separately, leaving the original data intact. Because the data are easy to edit, it is easy for a farmer to formulate a bewildering number of alternatives. We try to encourage him to think very carefully about alternative farm plans and strategies. Likewise, in making the final evaluations and assessments, we find ourselves generalizing to broad overall strategies.

Data Collection

Farm business data collection is expensive both for the collecting agency, as well as the individual farmer supplying the data. Thus, from the start it was important to keep collection costs low, but still encourage participation. Thus, extension was chosen as a delivery mechanism which identifies clientele, assists in data collection and maintains farmer support after the workshops. In addition, it was designed to collect farm level data for both research and extension purposes. To date, participation has been largely at the invitation of regional farm management extension specialists. These farmers are an important data source, and they are a group not generally or easily accessed by most extension programs. The program requires substantial time commitments from the farmers. It takes at least 12 hours or more to complete the forms with some assistance from extension personnel. This should not be surprising, however, because they are determining the planning values for the next five years as well as potential business alternatives. However, it takes far less time to update an existing data base-usually several hours or less.

Input

Data worksheets are divided into the following sections:

1. General farm financial, tax, trends and labour,
2. Machine, equipment and building inventories,
3. Crop inventories,
4. Field characteristics and inventories,
5. Machine systems and performance,
6. Materials and custom services prices and inventories, and
7. Crop production recipes.

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1 The base run also contains diesel fuel, electricity and repair calibration multipliers. Cash flows and net worths are simulated over a 5 to 15 year period.

All computer input sections follows the philosophy that "what you see is what you have". In addition, user-supplied data are accessible from the worksheets which are programmed in text graphics. Section 1 has been divided into a series of pages which can be electronically "flipped" back and forth. Input data are accessed by positioning the cursor using the four cursor arrows. Finally, data are checked during entry: illegal characters are ignored and out of bounds data are signaled before the enter key or the cursor keys are pressed. Sections 2 through 6 are based on a spreadsheet style of data display. Row and column labels are predefined, automatic parameter checks are included and special windows are created which display previously defined information and codes. Section 7 resembles a recipe card with windows displaying predefined fields, machine systems and materials. The recipe metaphor is used to construct the production coefficients of each enterprise.

The Structure of The Top Management Model

The Top Management Model combines a budget generator with a farm financial model. The recipe or budget generator approach has particular appeal in working with farmers and production specialists in that most crop production can be expressed as fixed input/output coefficients. Likewise, there are no "surprise" results as most costs can be recreated with a simple hand calculator. In order to evaluate major investment and growth alternatives, the basic budget generator approach was augmented with a cash accounting system so that dual accounts of variable/fixed and cash/non-cash categories are maintained. In addition, assets carry two values: cost basis and fair market value. Other unique features are:

1. A closed system of allocating fixed costs,
2. All diesel fuel, electricity, and repairs are calibrated,
3. Paid and unpaid labour,
4. Salaried and unpaid management, and
5. Data should be as physically oriented as possible.

Briefly, all fixed costs are allocated according to direct or indirect allocation procedures[1]; all fixed costs are accounted for regardless of whether or not the machine or building is used. The fixed cost pie is equal to the sum of its parts. Another problem with budget generators is that engineering equations used to estimate diesel fuel, electricity, and repairs are unreliable for any given individual. In order to compensate for individual differences, a calibration procedure was added to scale computer estimates to individual estimates. Hourly labour was different from salaried labour and unpaid labour was differentiated from paid labour. Finally, data are based on a very low level of aggregation and are based as much as possible on physical objects and relationships in order to simplify collection and maintain the ability to make fundamental changes to the farm with as little effort as possible.

In general terms, the model operates in the following fashion. Annual farm plans are constructed according to pre-specified, individual field rotations. The farm plan determines total crop production and acreages which in combination with

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1 For a description refer to R.A. Schoney, "An Evaluation of Cost of Production Techniques" also presented at this conference.

detailed crop recipes[1] generate crop sales and direct operating costs. Net cash returns in combination with machine replacements, land acquisition and existing debt service, generate the information required to determine federal and provincial income taxes. These data, plus family living withdrawals, are then used to generate annual cash flows. Cash flow deficits are financed according to their underlying causes. For example, a machinery purchase would create a large cash outflow, generating potential negative cash flows which then would be financed by an intermediate loan up to the value of the machine purchased. Any remaining deficits are financed by operating credit. Cash surpluses are either used to prematurely retire intermediate debt or are reinvested at a pre-specified rate. At the end of each year, all assets are revalued at their fair market value and all liabilities are adjusted for changes in debt position.

Output

Microcomputers have a tremendous impact on communication of results because there are fundamentally three types of output: (1) screen text; (2) printed text; and (3) screen/printed graphics. We differentiate between screen and printed text or tables because they fulfill different requirements. Screen tables should provide brief but concise information, while the printed tables should provide full information. However, the most exciting development is screen and printed graphics. In our own experience, it may take considerable time for a farmer to grasp the meaning of a five year cash flow when presented in tabular form, but only a few seconds when it is displayed as a bar chart.

Summary

We find working with farmers in extension and for research exciting and rewarding. However, there are a large number of changes and modifications which need to be considered. First, we need to make the model more realistic by incorporating risk. This can be done by using a triangular distribution and generating probability distributions. Second, we should consider the timeliness problem associated with sizing farm machinery. This would require an LP to be added. Finally, while we have learned a great deal about the problem and working with farmers within a workshop context, we are putting current emphasis on output which can be used with lenders. Accordingly, we will be shifting the financial analysis to the coordinated financial statements formulated by Frye at Illinois.

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1 Crop recipes are strictly deterministic patterns of production based on fixed input/output coefficients of yield, variable inputs (e.g. fertilizer), labour and machine complements and are specified by the budget generator.

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METHODS OF DETERMINING COP DATA AND INFORMATION

THE ONTARIO FARM MANAGEMENT ANALYSIS PROJECT

R.M. LINDSAY

What is OFMAP?

The Ontario Farm Management Analysis Project was begun 40 years ago as a cooperative project between the Ontario Agricultural College and Ontario Department of Agriculture. To this day, the project is and has been an integral part of the farm management program of the Agricultural Representatives Branch of the Ontario Ministry of Agriculture and Food. And although the names of the players have changed over time and the Farm Credit Corporation has joined the team, the objectives remain unchanged:

- To provide a "farmer's report" which contains an analysis of the individual farm operation, including an Income Statement, a Balance Sheet, a collection of ratio calculations, and a detailed analysis of each of the enterprises involved in the farm operation.

- To provide a "comparative analysis report" based on averages of the individual farms. These averages provide the farmer with information about other farms and knowledge of the differences between his operations and those of similar types of farms and enterprises. This type of information may assist the farmer in finding ways to improve the profitability of his operation.

There are other objectives related to staff training and farm management that the project helps to fulfill but these are the main two.

A Brief Look at History

Back in 1968, each Agricultural Representative in the province encouraged and assisted farmers to keep financial records of their farm businesses in the Ontario Farm Record Book (now commonly known as the Blue Book). Then, at the end of the year, those who wished to participate in the analysis service forwarded their books to the county agricultural office where they were checked and the pertinent data transferred to summary cards. These cards were forwarded to Guelph, where they were checked again for completeness and accuracy, and then the data was transferred to cards for data processing through the computer at the University.

In 1976 the main source of data was the CANFARM record keeping system. But since then, data from any accurate bookkeeping system can be transferred to an input form and analyzed. In 1977 the project title "Ontario Farm Management and Accounting Project" was changed to its present "Ontario Farm Management Analysis Project". And now in the 1980's the trend is to make greater and greater use of microcomputers rather than the University mainframe computer.

How is OFMAP Data Collected?

First of all it is important to realize that any farmer in Ontario can participate. A participant fills out a pink Farm and Enterprise Analysis Workbook - designed to be used by all farmers regardless of commodity. Page 1 allows recording of all cash revenue and expenses. Page 2 picks up assets and liabilities for both the beginning and end of the year. Assets are recorded at estimated market value. Page 3 requires detail on crops and yields as well as an estimate of the quantity of homegrown feed fed to livestock. Paid and unpaid labour required to operate the farm is also recorded on this page. Page 4 contains additional questions relative to technology employed and physical quantities produced. Only one of the six distinct commodity sections is to be filled in on this page.

There are two ways to fill in the form - for the whole farm, or, at an enterprise level. Therefore, the shaded columns are optional with two exceptions:

1. If there is more than one livestock enterprise on the farm, the shaded column must be filled out with appropriate information.

2. If a complete and full enterprise analysis of the separate contributions of the livestock and crops enterprise to the whole farm operation is needed, then certain expenses and assets must be allocated. Otherwise, the shaded columns can be left blank.

I said earlier that the participant fills out the workbook - but usually there is either an FCC Credit Advisor, or a Red Meat Advisor, or an Agricultural Representatives Branch staff member on hand - or a special training session has been held for farmers by local staff. Also, there is a financial incentive provided to Red Meat Plan participants (beef and sheep farms) of $100 for submitting their records for analysis.

We provide a standard set of inventory and transfer values of homegrown feeds that everyone uses.

How is OFMAP Data Analyzed?

We are using a combination of Lotus 1-2-3 and Symphony programs to prepare the individual farm reports. There are in fact separate templates for both whole farm reports and for enterprise level reports for eight commodities. Once a report has been scrutinized and mailed back to the contact person, the data is stored in a database program called The Manager. From that we are able to select various combinations of farms for detailed analysis.

How is OFMAP Data Reported and Presented?

The annual Ontario Farm Management Analysis Project Report is presented in a buff coloured booklet. It is printed as a University of Guelph publication. Copies are made available in all county and district agricultural offices. A description of the criteria used to classify the farms by type and size of enterprise is given on page 1 of the report.

Beyond this report, we are providing county and regional summaries and studies of various kinds, for example:

- An Ontario Jersey summary
- A beef herd summary where averages were prepared on the basis of equity, labour, and housing
- Preparation of a beef cow case study
- A comparison of selling calves and selling feeders
- A tobacco farm summary for FCC.

Management vs Cost of Production

All in all, the Ontario Farm Management Analysis Project provides the most comprehensive set of farm management information available on an annual basis for Ontario farmers. The reports are widely used by farmers, policy makers, lenders, and research and extension workers.

However, because information concerning investments and incomes for various types of Ontario farms is not available on a continuous basis from other sources (aside from the Ontario Dairy Farm Accounting Project), there is always a temptation to use the data generated by this project to compare earnings from different types of farming, and to establish trends in earnings for each type of farm over a period of time. It should be recognized that these data are not well suited for these purposes because the sample of farms on which they are based is not necessarily representative of all Ontario farms. Furthermore, year to year changes in the results are due in part to the fact that there is considerable turnover in the farms participating in the project. Also, the study is liable to include a predominance of farmers who have an interest in and an aptitude for bookkeeping.

Frankly, it is not known what cross-section of Ontario farmers are represented by this report. The inclusion of more low equity farms (from FCC's Advisory Services Section) this year should be noted since they will tend to decrease the average equity from that of previous years. Because of the significant number of farms included and the method of sampling, i.e. random volunteerism as opposed to strict randomization, it is felt that the group averages are typical. They are not necessarily representative of industry averages.

METHODS OF DETERMINING COP DATA AND INFORMATION

THE FEEDER PIG ENTERPRISE

ANDY BUNN

The format for the cost of production that I use was originally developed by Ontario Ministry of Agriculture and Food (OMAF) economists in the early '70s. I have added a little realism to their original format through working with producers, and I think now we have one that can be used by pork producers for making management decisions. I do have a manual that outlines exactly how we arrive at all our costs. This manual can be obtained from the various OMAF offices. In my budget, I covered three types of enterprises. These are the commercial pork operations, feeder pig enterprise, and sow weaner to finishing enterprise. Today, I will be covering the feeder pig enterprise.

Normally, these costs are for a specific month, and the one that you have is for the month of December 1985 (Appendix 1). If we look at the income in this feeder pig enterprise, we see that we used an average of 16 feeder pigs marketed at a weight of about 50 pounds (or 22.7 kg) and an average price was about $1.12 (or 2.47 per kg) during the month of December, bringing a total income of $896. This is the income for the feeder pig enterprise. I have broken the costs down into operating costs and capital costs. First let us examine the operating costs - they are a little easier to understand. The feed is the main cost. We put in 2,600 lbs. (or 1179.3 kg) of feed to look after the sow and the boar portion of the ration. The cost of the feed is based on the price the farmer can get for corn if it is marketed during the month of December. We also include some purchased feed in the budget. The last feed group is pig starter which is probably made on the farm. Some other operating costs are also included. These are veterinarian and medicine expenses (such as vaccinations, and iron injections), marketing costs of the sows and feeder pigs, and hydro charge. Interest on all the costs up to that specific point is then tabulated. Normally most producers have an operating loan with their banker. Feed and hydro bills, for example, will be paid from this loan. An interest rate of prime plus 1 percent is normally used. Because about two litters or more are produced normally per year, we base interest expense on only half the cost and for the year.

Capital Costs are a little more difficult to understand, but we feel they are legitimate costs and should be charged against the operation. These costs are the depreciation on the sow, and here we have calculated this from the price of the commercial cross-bred and gilt and the value of the cull sow. These values are then spread out over a 2-1/2 year period, and there is a depreciation charge determined. Interest on investment is calculated, since normally if a producer did not have these dollars tied up in sows and boars, the money would have been invested in Canada Savings Bonds. We used their interest rate for this calculation. Death loss and overhead costs are computed. Overhead costs for boars are found by multiplying their average value by 4 percent. This is only an estimate, but it is a fair reflection of the overhead costs. Housing and equipment costs are broken down in three groups. These are a third of the cost for the building costs, a third for equipment, and a third for labour. Currently, in Ontario, overhead costs are running anywhere from $2,000 to about $4,000 per sow in a farrow-to-finish operation. The building costs, based on some

information provided by our Agricultural engineers, are about $141,000. This cost area is necessary for livestock housing, storage and liquid manure storage expenses. Equipment costs are about $62,000 which is the equipment involved in the feeder pig enterprise. Cost considerations are also made for the DIRTI five[1]. These costs are broken down per sow, per feeder pig and per hundred weight. In comparison, operating costs are usually broken down on a per feeder pig and hundred weight basis. We tell producers that if they can cover their total operating costs and make a contribution to capital overhead costs, then they should keep producing. Hence, Pork News and Views represents a publication we have designed for producers to help them better understand their costs and help them in their management decisions.

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1 The DIRTI five includes depreciation, interest, repairs and maintenance, taxes and insurance.

METHODS OF DETERMINING COP DATA AND INFORMATION

THE METHODS USED IN ONTARIO CROP BUDGETS

ERROL D. MCKIBBON

The Economics and Policy Coordination Branch has been conducting cost of production studies since 1948 and is presently using three methods to develop costs of growing crops in Ontario.

On Farm Studies

This has been the most common method in the past but has not been used as extensively in the last five years. This method involves selecting a sample of growers, usually in different areas of Ontario and visiting with them at the farm several times before, during, and after the growing season.

The fieldman obtains labour, machinery and materials involved with the different cultural operations undertaken in growing the crop. As well, information on land, buildings and other overhead is also obtained. When the crop is sold, data on yields and returns are obtained. Forms are usually left with the grower so he can record data as operations are completed.

Computations and analysis are made for each farm and then totalled to get regional and provincial averages. Cooperators receive information for their farm compared to the regional or provincial averages.

The main advantage of this type of study is that it shows what is actually happening on a number of farms growing a particular crop. Also, it is usually done with commercial growers.

The main disadvantages are that it is time-consuming, usually taking at least a year to complete, and is quite expensive to obtain the desired results. All growers in the sample may not carry out all the farm operations represented in the survey. As a result, on-farm COP studies do not give the true cost for the farm operation at an aggregate level.

Consensus Meetings

This method of generating cost of production information is becoming more popular, especially with small acreage crops where it is difficult to get a large number of cooperators.

A group of growers, usually four or five, a horticulturist familiar with the crop under study, and an economist meet to determine the physical inputs involved with the cultural operations of the study crop. Once the labour and machinery hours, quantities of materials, and other particularities of a crop are determined, the information is fed into the ACRES program where appropriate prices of the inputs can be applied. The output is then checked by the committee and any adjustments can be made.

This method is quite inexpensive, and gives true costs of particular operations. As previously mentioned, it is particularly effective for crops that are not grown extensively in the province. Growers on the committee may not be commercial farmers because of the relative size of popularity of the crop.

Budgets

This is the main method presently used by the Economics and Policy Coordination Branch to generate cost of production information.

Cultural operations and physical inputs are set up in the ACRES program and when a new cost of production is needed, the latest prices are entered in the program. We are presently doing this on a yearly basis, but it can be updated at any time. There is also enough flexibility in the program such that changes can be made to operations, yields and returns to show the effect of different management prices.

This method allows studies to be done quickly, inexpensively, and as often as new information is available. It allows a small group of people to generate a large number of cost of production studies with fairly accurate results. However, it is necessary to keep abreast of any new technology that may evolve and incorporate it in the program.

Summary

Although the "budget" method of cost of production work is now the most common method used, on-farm studies and consensus meetings will continue to play an important part in developing the basic formula to allow the ACRES program to generate the information required. The Economics and Policy Coordination Branch is presently producing cost of production information on approximately 50 Ontario-grown crops.

THE ONTARIO DAIRY FARM ACCOUNTING PROJECT

JOE SCHAEFER

Project Objective

The objective is to develop, establish and maintain a system of obtaining regular, representative and consistent farm production and management data which meets the farm data base requirements of the Ontario diary industry in the three areas of policy, research and extension.

Project Sponsorship

The dairy study is a joint venture of the Ontario Milk Marketing Board, the Canadian Dairy Commission, the Ontario Ministry of Agriculture and Food, and the University of Guelph. The project is directed by a Steering Committee consisting of a senior person from each of the four organizations, and a Technical Committee consisting of Economists and Extension Personnel from the same organizations. The Steering Committee is concerned mostly with the project budget and general policy. The Technical Committee is concerned with methodology of data collection, data analysis, maintaining documentation, etc. The project has been in operation since 1976.

Data Source

The data is being collected from a representative sample of about 150 dairy farms. Approximately one-third of the sample is dropped off each year, with a corresponding group being added. The target size for the group is 150 farms, with each producer being asked to stay on the study for three years. The 150 herds are grouped into six geographic areas for research purposes. The target sample size within each geographic area is adjusted according to the total number of dairy farms in the area. The random sample list of names of each year's sample of prospective new producers is drawn from the OMMB files.

Project Personnel

The project is run by a full-time manager and clerk, and three full-time field technicians. The manager and clerk work out of the OMMB offices in Mississauga, while the technicians work out in their regions.

Project Methodology

A set of financial records is created for each farm. All farms enrolled in the project are registered on the Canfarm Record System. Canfarm provides a systematic way of recording and editing the financial and related physical data for the project as well as a means of grouping the data for all of the farms into a "data base".

To provide uniformity of data collection, the technicians carry out the actual on-farm recording of financial transactions and other data. Farms are visited on a regular basis during the year to record the financial data and relevant production information.

The Canfarm system permits separating information into enterprises or profit centres and accounts or cost centres. The project currently uses six enterprises and one cost (overhead) account. The enterprises are: general farm, dairy herd, replacements, small grain, corn grain/corn silage, and hay/haylage/pasture. All expenses are recorded directly to the consuming enterprise whenever possible. Overhead costs are accumulated until year-end, at which time they are pro-rated across the enterprises.

All fixed assets (land, buildings, houses, machinery, and intangibles) are recorded at both original cost and estimated present market value. Depreciation is recorded using a diminishing balance rate adjusted to reflect the useful life of the fixed asset.

Feed and dairy livestock inventories are entered in the system using standardized values. These values are reviewed once a year to ensure that they reflect current market values. Inventories, sales, purchases and production are used to calculate the apparent feed consumption by the livestock. Feeds that are produced on the farms are "transferred" to the consuming enterprises to reflect as closely as possible the amounts actually being fed.

A considerable amount of "supplementary" information is collected to add to that gained from the financial records. This data is used to provide a geographic and physical description of the farm and how it is operated. It is also used to guide the allocation of overhead costs from the cost account and the transfer of feedstuffs from the producing enterprises to the consuming enterprises.

METHODS OF DETERMINING COP DATA AND INFORMATION

DATA COLLECTION AND MODEL DEVELOPMENT

DEE SHUTE

Most of my experience has been with the supply-managed commodities and stabilization, and so the comments that I make regarding data collection and model development mostly relate to those items.

The methods used both to collect data and develop models must be, to the extent possible, reflective of the use to which the data will be made. The wide variety of production situations for one commodity as a result of farm size, soil, climate, input costs, state of technology and managerial ability emphasize the need to clearly define the end use in advance of collecting data and developing cost models. My experience with the national supply-managed commodities and stabilization has enabled me to view two rather distinct types of data collection procedures and modelling methods. Data collection procedures which ranged from statistically acceptable survey methods to relatively subjective development of consensus type data. The supply management programs for chicken, eggs and turkey use cost of production formulae as a basis for establishing prices to producers. Because the price is determined by the national agencies or their provincial commodity boards, replacing market price, the cost formulae are used to calculate the total cost structure. The data for these formulae or models, are obtained through fairly comprehensive surveys. The substantial variability that can and does exist between the farms involved and the tremendous economies of size attainable in the poultry industry, for instance, have had implications both for sample design and cost of production development and analysis.

The high degree of variance exhibited within and between provinces by the populations has resulted in larger producer samples being required to estimate the average industry cost with a high degree of confidence. Because of the implications associated with the use of this average cost estimate, the highest degree of accuracy needs to be attained. In addition to those objectives required of cost data used for pricing under supply management, there is the additional problem of valuing the implicit or opportunity costs of operator labour and return on equity. While cost of production is a supply related concept, the market price is determined by the interaction of both supply and demand. In a free market, costs such as labour and equity return are price determined which is somewhat inconsistent with the attempt to use total cost of production to determine price. Because the cost of producing a commodity tends to convere with price over the long run, as a result of industry structural adjustment, the costing of these components is extremely important and must be determined, not only on the basis of what is considered fair and reasonable, but in conjunction with other data relating to economies of size, code of values, production variability, time trends, capital gains and product demand.

Some of the data collection problem associated with producer surveys are: the high cost, sampling errors such as non-participation in the random sample (with a refusal rate that's high and climbing), and high variability of the costs. Non-sampling errors are: lack of records, any inaccurate recall by producers, some producers with gross incomes greater than $100,000 still operate on the the shoe-box system. Dependence on producers for some judgemental costs where

there is no market data and the direction of the bias is usually high. The positive attributes are that there is the availability of cross-sectional data, the average cost of the sample group can be determined, and it helps in identifying reasons for variability of costs among firms which in turn assists in identifying potential for structural change in the industry.

Agricultural stabilization has the same concerns as supply management, and that means stability. The procedure used to accomplish this though is quite different. Rather than stabilizing supply, the agricultural stabilization program attempts to stabilize the prices received by producers in order to assist the industry to realize fair returns for its labour and investment and to maintain a fair relationship between prices received by producers and the costs of goods and services that they buy. Tripartite programs have the same basic objectives. Cost of production data for stabilization model development basically uses as simulated average cost of production approach. Cost data used are from a combination of sources: research, engineering, general statistical, extension, consensus, and/or available survey data. While it is very difficult to develop an average industry cost model using this method, an attempt is made. Costs are rated by percent in relation to its current significance or future potential impact. The main problems with these types of data is the difficulty of verifying representativeness and accuracy. For the data, may not represent an average cost of production for the industry but rather may provide only a cost estimate without variance. Additionally, these data require a very skilled project leader, knowledge of the industry and regional expertise in the area being cost. However, cost models do provide some data at a considerably low cost and are useful in monitoring time trends in cost of production for the industry.

For stabilization, only cash costs are considered. As a result, cost model data may be reasonable as it is not so much the absolute level of costs that is important in a stabilization calculation, but the direction and rate of change.

At all times, applying cost of production data in areas of national policy, information and analysis, requires careful knowledge and consideration of the problems inherent in aggregating the costs of various firms that make up the industry. The concerns and problems arising from the use of either survey or consensus-type data give credence to the use of model farms for cost information. This is similar to the approach that was mentioned by Doug Lane of FCC (the use of micro labs) and what Dr. Driver has often mentioned in the way of using representative farms to depict different technologies. Collecting such cost data, over time, would allow for analyses of costs by type farm, of trends and rate of adoption of new technology, of relative changes in production inputs and between input and output, and of changes in market prices and yields. Because of high variability, cost of production information needs to be collected from a wide range of model farms designated by different variables such as size, location, type and technology. There possibly could be a significant cost associated with this method of data collection, but weighted against the high cost of present government programs and potential impact on producers and consumers, it would seem justified.

Another source of cost data that may become available in the near future is tax file data at an aggregate level. This type of data has potential for deriving provincial average costs by commodity and size of operation, while the potential application of such data will require more analysis to verify their usefulness for

program and policy input, preliminary work indicates a high potential. The data are somewhat limited, however, for providing information at the farm management level or for purposes requiring knowledge of changes in inputs over time.

In the ten years that I have been involved with various areas of cost of production, there have been many developments - more and more refining and standardizing of concepts and data. Although we have a long way to go, I think we have to agree and derive some satisfaction from the thought that improvement is progress.

METHODS OF DETERMINING COP DATA AND INFORMATION

AN EVALUATION OF COST OF PRODUCTION TECHNIQUES

R.A. SCHONEY

Introduction

Canadian farmers face economic and financial challenges that are perhaps as great any time in the past. Eroding land values, volatile prices, rapidly emerging technologies, make it crucial that farmers closely monitor their farm businesses. One of the tools farmers can use to monitor and assess their farm businesses is cost of production. Cost of production is a popular concept that many farmers and agricultural professionals use without fully understanding either the underlying theory or its limitation. This paper briefly reviews the theoretical foundations underlying cost of production and its limitations.

Measurement of Economic Costs of Production

Since most people compare cost of production to output price, it is usually convenient to state average total costs on a per bushel basis. Equation (1) is the definition of average total costs used in the Top Management Model. The ATC for crop k is defined as the sum of variable costs plus allocated fixed cost less returns from other secondary products[1].

$$(1) \qquad ATC_k = [CX + VA + S_g(M+H) + S_dF - R]/Y_k$$

where:

- ATC_k = average total cost of production,
- CX = variable materials and custom services,
- VA = variable machine and building costs,
- S_g = share of management and overhead,
- M = management fee,
- H = general overhead costs,
- F = capital asset fixed costs,
- S_d = direct share of fixed costs and
- R = returns from other enterprise products.

Variable costs are costs which vary according to output and can be subdivided into the following sub-categories:

1. Direct operating costs and
2. Unpaid labour

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1 Examples of secondary products are straw (e.g. wheat, barley and oats) or nitrogen contribution (e.g. soybeans and legumes forages).

Direct operating costs are the sum of:

1. Materials,
2. Custom service,
3. Power costs,
4. Repairs,
5. Paid labour, and
6. An opportunity charge for operating capital.

Materials include the cost of seed, fertilizer, chemicals, custom services and hail and crop insurance. Power costs include fuel oil, grease and filters. Like most budget generators, the PC Top Management incorporates a series of engineering relationships to estimate repairs and power usage. Diesel fuel use is estimated by power loading versus fuel efficiency functions and horsepower of the power unit. Repairs are estimated as a function of usage and new machine replacement costs. These equations and, in particular, the repair relationships tend to be unreliable for any given individual farmer. Thus, a calibration procedure was added to scale our estimates of fuel and electricity usage and machine and building repairs to the actual participant values. Thus, the engineering equations are used to allocate repairs and power usage among the various machines. While the repair or fuel cost may be incorrect for a particular machine, this method ensures that the total cost for the farm is correct. These multipliers are retained and used to scale computer estimates for "what if" situations[1].

Operating Capital Charges

Operating Capital Charges are the sum of total direct cost multiplied by the opportunity cost of capital (12% annual interest) for one-half a year. The operating capital charge for an enterprise with a total direct cost of $40 would be: $40 x .12 x .5 or $2.40.

Unpaid Labour

Unpaid labour is the final major variable cost. Labour costs are based on direct hours used in operating machines multiplied by an hourly wage rate[2]. Usually, the labour requirement for an enterprise is 1.1 or 1.2 times the tractor and harvesting equipment hours. The extra .1 or .2 hours takes into account time spent greasing, adjusting, hitching and unhitching, etc.

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1 The calibration procedure is incorporated in the current year of the "base run". The estimated multipliers are used to scale future estimates of this run and are retained for use with other trails.

2 In the Top Management Model, both unpaid and paid hourly labour and salaried wage are delineated. A reservation wage is that wage necessary to keep the operator on the farm. A wage below this amount would cause him to seek employment elsewhere, either selling the farm or hiring the required labour.

Fixed Costs of Production

Fixed costs of production include the following:

1. Management charges,
2. Machine and building capital recovery charges, and
3. Land charges.

Management Charges

The management charges in the Top Management Model are based on a reservation prices which are user-specified.

Machine and Building Investment Charges

Machine and building capital recovery charges (CRC) are depreciation and interest charge incurred each year. The one-year capital recovery charge (CRC) for a given machine is defined as:

$$(2) \qquad = (V_0 - V_0) + (i \times V_0)$$

where: V_0 = beginning asset value,
V_1 = ending asset value, and
i = opportunity cost of capital.

Equation (2) states that the CRC is the capital depreciation or the loss in value of the asset over the year, plus interest forgone or opportunity cost of the capital invested. Note that all machines and buildings are valued at current fair market values.

Land Charges

The land capital use charge is associated with owning, renting or leasing land. Charges on owned land have presented considerable problems in estimating cost of production. There are several possible methods for assessing the costs of holding land. The first method used by the USDA is to separate the land holding function from the operating of the farm by converting all owned land to a cash lease. Another variation of this method is to estimate cash leases as a percentage of fair market value and then estimate the cash leases as a function of current fair market value. The last method is to estimate the long-run annual cost of holding land using the relationship:

$$(3) \qquad H = (i \times V_0) - (V_1 - V_0)$$

or

$$V_0 * (i - a)$$

where: V_0 = beginning asset value,
V_1 = ending asset value, and
i = opportunity cost of capital,
a = appreciation in land value.

Note: That Equation (3) is Equation (2) modified for capital appreciation. Melichar (1979) has estimated returns in the U.S.

In the Top Management Model, rented land costs are the actual amount of rent paid either as a cash payment or as a crop share converted to cash lease. Owned land costs are standarized at 5 percent of current land value, plus annual property taxes.

Methods of Allocating Fixed Costs

Economic theory suggests that fixed costs should be allocated in direct proportion to their marginal value product or shadow price. For example, an enterprise where timeliness is extremely crucial should receive higher machine use priority, while another which places few restrictions on timing receives a lower priority. Yet both may use the machine to the same extent and both are charged the same proportion of fixed cost under the direct use method. A similar problem exists in valuing land in rotations. Thus, higher-valued uses should support higher proportion of the total fixed costs (Johnson and Pasour, 1980). Several serious limitations are associated with the shadow price approach. First, the optimization of the entire cost structure is a difficult task requiring full knowledge not only of the entire firm cost structure but also of all alternative production possibilities and opportunities. Secondly, allocation of fixed costs according to the value of the product means that cost allocation is not independent of product price fluctuations (the price dependency problem)[1].

In general, most budget generators use one or two methods of allocating fixed costs of management, equipment and building: (1) direct use; and (2) indirect use. The direct use method is the method most commonly used by most budget generators as well as by the PC Top Management Model. The direct method is used to allocate the fixed costs of those assets whose use can be directly attributed to an activity such as a machine operation and a corresponding enterprise. Total machine and building usage is estimated from user-supplied speed and field efficiency values. Harvesting performance rates are recorded in yield units per hour and are not a function of ground speed. One of the flaws

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1 A variation of this approach is to assume that all other products, except the one being considered, are secondary products. This approach which can be labelled the break-even approach, assumes that all other secondary products just break-even so that the total cost for a primary product or enterprise consists of all costs less the value of all other secondary products or enterprises. This formulation implicity assumes optimal firm organization and long-run price equilibrium--not very appealing assumptions. This approach is reasonable where farms are characterized by one dominant enterprise such as dairy or wheat and all other enterprises are secondary. Finally, secondary products may be inputs to the primary enterprise, provide rotation benefits or reduce risk through diversification such as canola might provide in a wheat rotation.

common to many budget generators is basing annual machine use on farmer estimates. This can be a considerable source of error. In the 1980 Top Management Workshops, farmers were asked to estimate total annual usage for each machine and these estimates were compared against computer generated estimates. Participant estimates exceeded the computer-generated estimates by an average of 30 to 40 percent (Klemme, Schoney and Finner, 1981). This is not too surprising as computer estimates are traditionally based on field performance equations which estimate direct field time and do not account for travel time or engine hour meter errors[1]. Thus, in order to maintain internal consistency, the sum of individual usage should equal the whole. It is obvious that where they do not, serious problems can occur. In the Top Management Model, the direct allocation of fixed machine costs is based on summing individual use and allocating their cost to the enterprise based on its proportion of the total use.

The direct method works well with most machines, but some machines such as pickup trucks are employed for non-specific tasks or non-field operations. In addition, some types of activities involving management functions such as periodic field inspections and overhead machinery use (e.g. snow blowing or trips to town) are difficult to allocate in a direct fashion. For these categories, an indirect use category is created in the Top Management Model.

In general, there are three possible approaches to allocating indirect fixed costs:

1. gross returns,
2. valued added, and
3. direct costs.

The first method, using the proportion of gross returns was once a common method and generally gives satisfactory results when similar crops are grown. In addition, this method may be consistent with professional management charges[2]. However, this method does not give satisfactory results when crops differ considerably or when mixed grain-livestock operations are considered. In the latter case, home grown crops which are used as inputs to other enterprises can be charged to that enterprise at their opportunity cost. Thus, there can be double charging which produces biased livestock costs in relation to crop production costs.

The Top Management Model uses the second approach, which is valued added, to allocate indirect fixed costs. The value added approach allocates fixed costs based on the net value added, which is defined as gross returns less direct operating costs. This approach also presents problems in that some enterprises such as fallow have zero or negative value added and thus, are not assigned any of the indirect fixed costs. This problem could be solved by making fallow an intermediate product and transferring the associated costs to the appropriate crops. However, in our experience the acres of fallow varies considerably from year to year so that the acres of crops on fallow differs from fallowed acres in any given year.

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1 Of course, there may be considerable estimation error which is likely to be biased towards over-estimate. This is particularly true for older machines which may not be used very much.

2 For example, some professional farm managers may charge from 6 to 8 percent of gross farm income depending upon the type of farm.

The gross revenue and value added approaches both create a problem of price dependency. The allocation procedure is determined by output prices. Thus, the allocation of costs may shift from year to year as price patterns vary. A good example of this is 1985 and 1986. Last year Saskatchewan canola prices were very favourable - ranging as high as $8.00 or more. This year a typical canola price is $6.00 per bushel. Over the same period, wheat prices changed far less. The result is that the cost of producing canola will decrease over the two years because of the allocation procedure, even though other costs have not changed and likewise, the cost of producing wheat will increase even when other costs have not changed. The price dependency problem gave rise to the third approach used by the USDA in calculating their costs of production. This approach assigns indirect fixed costs in direct proportion to total costs and, therefore, is independent of output prices.

Data Collection Techniques

Cost of production studies are expensive because of the detailed nature of the data and the relatively high level of precision required. Relatively high levels of farmer involvement are required because most data cannot be directly based on farm records. In addition, high levels of precision are required because the errors tend to be cumulative in nature. Finally, particular care must be taken to ensure comparability of data between farms.

There is also an aggregation problem in that a supply curve is a summation of individual marginal costs and thus, cost of production estimates should be weighted by individual production; an unweighted average of costs should not be used. Finally, many farmers and policy makers tend to think of cost of production as a short-run estimate. However, for all factors to be variable and correctly allocated, there must be present a long-run equilibrium.

There is debate as to the appropriate source of data--should data be ex-ante or ex-post. Ex-ante data may better reflect producer intentions, and, in my opinion, is the better data base when time series information does not exist. However, many farmers may be overly influenced by recent events, particularly in forecasting yields. Perhaps the best base is a combination of both. Production plans could be based on ex-ante information, but yields could be based on long-run averages.

An Evaluation of Cost of Production

Cost of production studies have two main purposes:

1. for use in policy formulation, and
2. for use as a diagnostic device.

There are a number of articles debating the usefulness of cost of production as a policy tool in setting price support programs which will not be reviewed in this paper[1]. Most agricultural professionals would agree with the potential usefulness of cost of production studies as a diagnostic device in complementing the usual financial ratios. However, like any diagnostic, benchmark performance standards must be established first; it is not enough to compare ATC to price

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1 See for example Groenewegen, and Clayton; and Pasour.

which may be the common perception. Standards should be developed for each cost component, allowing each individual to assess areas of strengths or weaknesses.

While budget generators and the associated cost of production models work well in evaluating cost efficiency and short-run enterprise selection, they are ill-equipped to evaluate major investment and growth alternatives because they ignore the financial structure of the firm. Further, many farmers are more concerned with cash flows than long-run economic cost efficiency. Accordingly, the basic budget generator model was augmented with a cash accounting system.

In the Top Management Model, there are dual accounts of variable/fixed or cash/non-cash categories for the various cost components. In addition, assets carry two values:

1. remaining cost basis, and
2. fair market value.

While in theory the investment decision can be stated as simultaneously maximizing terminal net worth subject to cash flow and financial constraints, in working with farmers, the investment problem is decomposed into a two step examination of economic profitability and financial feasibility. Long-run economic profitability is measured by changes in net worth and financial feasibility is determined by examining cash flows and changes in debt structure over time.

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METHODS OF DETERMINING COP DATA AND INFORMATION

ACRES PROGRAM

BLAIR CAMPBELL

INTRODUCTION

The preparation and publishing of budgeted crop and livestock information has been an important function of the Economics and Policy Coordination Branch for many years.

The Economics and Policy Coordination Branch over the years has helped to develop a comprehensive record keeping system for farmers. When the Branch was organized in 1948, it was given the mandate to develop farm and enterprise accounts. These accounts, in the form of cost studies, were designed to provide information on all types of farming operations.

Traditionally, the single enterprise and livestock accounts were prepared for farmers. This was accomplished through farm visits, interviews and then by analyzing collected information. Summaries were sent to cooperating farmers. Reports in the form of county, regional and provincial acreages were published.

Budgeting

There has been a gradual trend away from the collection, tabulation, and analysis of single enterprise accounts and a trend towards budgeting. More farmers keep records, and as a result have a better idea of costs and returns. Recently the availability of computers and their increased "friendliness" has made the task of record keeping easier.

As more people make use of computer technology, the need for institutions such as the Economics and Policy Coordination Branch to provide record keeping services for individuals and farmers has diminished. In today's climate of high travel costs and time constraints, the ability of institutions to meet farmer requirements has diminished, yet the need to provide accurate, reliable and representative cost data has not.

Budgets are defined as a management tool used mostly for planning. Farmers, professionals, and others in the business of providing advice and counselling are developing general enterprise budgets to estimate present and future costs, and returns for a single commodity.

The ACRES Approach

In the ACRES program, we have taken the following approach. Special attention is paid to the quantities and prices of physical inputs. Information on the amount of physical inputs is gathered from a number of sources:

1. Previous studies,
2. Surveys,
3. Technical input/output coefficients, and

4. Consensus of knowledgeable people such as farmers, extension workers, researchers and agribusiness personnel.

Our aim is to construct typical production profiles that represent typical production technology, cultural practices as well as types and quantities of materials for each important commodity.

The ACRES Program

Numerous computer programs capable of generating budgets or cost of production estimates have been developed. They vary in their degree of sophistication, but most can quickly and efficiently generate a large number of estimates for a wide range of conditions.

The ACRES program stands for AGRICULTURAL CROP ENTERPRISE SYSTEM and is the result of input by several people in the Economics and Policy Coordination Branch. The program, written in FORTRAN by Gary Lentz, is based on a program originally from Montana for use by the Extension and Soil Conservation Service, and then rewritten by Alberta Agriculture. The Alberta program was combined with a machinery cost program written by Blair Campbell. The present program integrates the Ontario machinery cost system and the modified Alberta Crop Costs and Return Program.

Originally, the ACRES program was designed to run on the main frame computer at Queen's Park. Recently Gervan Fearon has modified the program and converted it for use on the IBM-PC micro-computer.

METHODS

Output From ACRES

The first item that appears in the output section is a listback of all the input data. Essentially it is a reproduction of our input section.

The second item is a listing of various factors used in the computation of machinery costs, and include items such as interest rates used on debt and equity, proportion of machinery owned and financed, the cost of gasoline and diesel fuel, storage and fuel costs.

Farm Machinery

Farm machinery costs may be divided into fixed and variable costs. Fixed costs include depreciation, interest on investment, insurance and housing. Variable costs include fuel, lubrication, repairs and maintenance.

Normally we use the declining value approach, 15 percent of the remaining value on tractors and all self-propelled equipment, and 10 percent on non-power equipment. No depreciation is used on obsolete equipment.

Interest on investment is divided into two components. Interest on equity represents the cost of financing machinery purchased on direct credit. Interest on

equity is considered an opportunity cost. Interest rates charged depend on current estimated debt servicing costs and current bank deposit rates. In most cases we assume a 30:70 debt equity ratio.

Storage and insurance costs are estimated by taking 1.5 percent of the purchase price. The ACRES program has the flexibility to handle a factor of other than 1.5 percent, depending on the particular case.

Fuel and repair costs are based on the rates of fuel consumption and price. Fuel consumption rates are based on horsepower engine ratios. For example, research indicates that tractors operate on about 55 percent of their maximum power.

Repair and maintenance costs include parts, labour, and facilities necessary to keep the machinery in good working order. Repair and maintenance costs used in the ACRES model vary from 9¢ to $1.00 of the purchase price.

Farm trucks are also used in the model and with the exception of licence, insurance and repairs. The cost is calculated in a manner similar to other farm machines. The items mentioned are based on information supplied by the Ontario Ministry of Transportation and Communications.

An hourly rate for each machine, used in a particular run of the ACRES model is calculated. Hourly rates are important as they are used with hourly rates of labour to estimate the cost of each field operation performed on the crop.

Operation Costs

In Table 4 operation costs are outputted. This table is very important because it lists details on machine, labour and other costs for each operation specified. The costs per hour outlined in the previous section are combined with the accomplishment rates per hour to compute tractor, machine, labour and other costs.

The machinery combinations are specified on the input form along with accomplishment rates, labour requirements and labour class for each operation. The hours per acre, which include machine and labour (hired and operator) are computed from the accomplishment rates and multiplied by the appropriate hourly costs to establish the total cost.

Labour Costs

Labour costs are broken down into two categories; hired and operator. For each operation the type of requirement is specified on the input sheet.

Materials and Cost

For most crops materials include the cost of seed, fertilizer and spray. Other items such as drying fuels, and harvest containers may be included.

Land

Determining the annual cost for land can be controversial. During the past two decades, purchasers of farmland have been willing to pay more for land than can be justified from agriculture production. Purchasers believe the speculative aspect of land ownership offers benefits above those received from crop production. For this reason, the appropriate interest rate used in calculating the interest on bare land for those crop production estimates is the real interest rate. The "real interest rate" is defined as the current lending rate of interest adjusted for inflation.

In the ACRES model, interest on land is calculated as follows:

1. The value of bare land was based on the average value of land in areas of Ontario where the production of each study crop predominates.

2. The interest rate applied was the five year average of the current lending rate discounted for the rate of inflation, which resulted in a 6.4 percent rate.

The farm real estate taxes used for each study crop reflect the area of production and are subject to Ontario's Farm Tax Reduction Program.

Interest on Operating Capital

Interest on operating capital is included as a cost component and is used to account for capital required to purchase materials, fuel, and pay for hired labour. It is calculated by applying an interest rate of prime plus 1 to the cash costs for the average number of months that the money will be used, before the grower begins to sell his crop. The time interval may range from nine months or longer.

Overhead

Certain costs such as telephone, electricity, and farm maintenance are usually thought of as fixed overhead expenses. The method of handling overhead costs in the ACRES program is to enter a user specified amount per acre.

Management Fee

An allowance for management is included in all cost of production estimates. The management fee is usually charged at the rate of 5 percent of the estimated gross returns.

Other Costs

Other costs included are operating costs, fixed costs, gross margin, cash and non-cash costs.

FUTURE DIRECTIONS OF COP

RISK ANALYSIS IN COST OF PRODUCTION AND FINANCIAL MANAGEMENT

JACK CLARK

Cost of production (COP) estimates are made by farmers, accountants and institutions for two main uses. These are:

1. Estimates of average historical cost of production for a group of producers in order to estimate the "average profitability" for that group and to establish a target price (if an organization has price setting powers) or an appropriate government program.

2. Calculation of the cost of production of individual enterprises by a farmer to use in planning future financial and management decisions for that business.

Risk analysis has very different implications for cost of production calculations prepared for the two uses. Risk analysis in its broadest sense refers to estimates of variation from the average or expected value and the implications that these variations will have on the expected outcomes. When cost of production calculations are made to estimate average profitability, they are based on annual surveys and the variations around the mean estimates are caused by differences in fixed resources available, production technology used, and production and management efficiency of the businesses surveyed. Variations due to these factors should be minimized in order for the mean estimates to be representative.

Minimizing the variation of these estimates can be achieved by careful stratification of the sample selected and reporting the COP estimates for each stratum. However, variations around each mean estimate will exist and some measure of these variations (such as the standard deviation or coefficient of variation) should be reported along with the means. When those variability estimates are reported, they give all potential users information about the distribution of the observations used to calculate the mean. The next speaker will talk about how many COP's there are so I will not deal further with variation amongst these estimates for risk analysis, except to state that cost of production estimates, which are to be used for any purpose, should be reported in terms both of means and some measure of variation.

Risk analysis is most useful for farmers who are using data to evaluate future production and financial opportunities. Cost of production data in the form of enterprise budgeting data from farm record surveys and from the farmer's own records provide important information used in planning.

The user needs to know the average or expected value of each estimate, but also the expected variation around that value in order to assess the probability of achieving that outcome and, therefore, the risk that the outcome will be less than expected. I am now defining risk in terms of variability of outcome which is less than expected and, therefore, in terms of probability of losses. The variability parameter reported with any mean estimate obtained from survey data will help decision makers assess the reliability of that mean. However, the data would be of more use to managers for planning purposes if they have access, also, to data based on a stratified sample and to the physical input-output data rather than cost data.

The best source of these data is the farmer's own enterprise records, but when new enterprises, or new technologies are being considered, budget data from outside sources must be used.

Use of these data in management and financial planning requires an assessment of the year to year variation of outcomes, as well as sample variation. This is year to year variations of product prices, variable input costs and yields. These year to year variations will be a major cause of actual outcomes being less than expected outcomes. Losses due to disasters can be insured against and the losses minimized, but the cost of insurance would be too high for most price, cost and yield generated losses because of the difficulty of estimating the probabilities of outcomes, or because of the payoff from reducing the level of potential loss is too low for insurance to be a valid option.

In these cases, the manager should assess the potential variation in the budget estimates and develop a risk strategy. Risk analysis is part of this risk strategy which involves calculating the expected variation in outcomes due to the potential variations of the factors I mentioned above, and reducing the budgeted estimate of outcome by some factor based on the estimated variation and the individual manager's risk averse behaviour. Then the decision maker uses the discounted budged data as the basis of forward planning.

There are several methods of risk discounting which can be used by managers when they are using COP or budget data for forward planning decisions.

The first is used to analyze capital budgets to evaluate investment opportunities. The best method to use for long-term capital budgets requires projecting the net cash flows generated by the investment over the planning period corresponding to the economic life of the asset and discounting the estimates to present values and comparing the present values calculated for several investment opportunities. The (minimum) discount rate used to obtain present values is generally the required rate of return of the business, but this rate can be adjusted upwards to reflect the riskiness of different opportunities. Thus, (for example) if expansion of a dairy enterprise is being compared with expansion of a beef feedlot, the discount rate for the feedlot could be 5% points higher to provide an extra level of risk discounting when the risk averse manager is assessing the beef feedlot which has a higher risk. In this way if the beef feedlot estimates, after risk discounting, result in net present values higher than for dairy, the manager has assurance that the feedlot income results are likely to be high enough to compensate for the risk of losses expected to occur periodically with beef.

A second method of risk analysis involves the use of the mean-variance relationship to adjust estimates of future outcomes. Variance is a statistical measure of variation and the standard deviation is the square root of the variance. If the distribution of variation from the mean approximates a normal distribution, the mean plus and minus one standard deviation encompasses 68 percent of the observations. Thus, since the mean is at the 50 percent level of the values, the mean minus one standard deviation represents an outcome whereby 50% - 34% =16% of the observations will be less than this value and 84 percent will be higher than this calculated value.

If the mean and standard deviations are based on previous annual data, then these estimates can be used to forecast potential future outcomes. Of course, when historical data are used to forecast future outcomes, the planning assumption being used is that conditions in the future are similar to those that prevailed in

the past. Any change in future production and economic conditions will reduce the accuracy of forecasts. However, if we assume that conditions remain relatively constant, the manager's risk averse behaviour and the variation parameter can be used to adjust the means to include a risk premium.

The estimation to utilize these parameters to adjust for risk is given in the following equation. The risk adjusted outcome is named the representative outcome.

$$\text{Representative Outcome} = \text{Expected Outcome (Mean)} - (Z \times \text{Standard Deviation})$$

In this equation the value of Z is the decision maker's coefficient of risk aversion.

A Z value of 0 indicates that the decision maker is risk neutral and will evaluate alternative opportunities without any risk premium. On the other hand, a Z value of 1 or more indicates that the decision maker is quite risk averse and only wishes to consider opportunities which have a probability of 84 percent or more that the outcome will be greater than the representative value.

Of course, the expected average of outcomes over several years will be based on the mean, but risk discounting will lower the representative values and reduce the calculated profitability of risky opportunities. Then the use of these representative values in place of expected mean values in budgets and in linear programming and simulation models will reduce the level of adoption of the risky opportunities in the final budgeted solutions.

These means and standards deviations can be used also in planning models used to evaluate financial management decisions. These models include multiperiod linear programming or quadratic programming models which utilize means and standard deviations of enterprises to obtain solutions which are discounted for risk.

A third method of risk analysis uses a model which calculates the expected budget outcome 100 or more times to approximate the range of observations represented by variation parameters. Each successive budget solution of the model uses a value of the risky factor which can vary from the preceding value. These values are selected by a random generator program to approximate the probability distribution of the variation parameter. The method requires the use of a relatively large computer because of the large number of calculations required. The method uses a Monte Carlo sub-routine which is sub-routine of budget simulation models so-called because the method obtains a solution based on a large number of outcomes representing the probabilities of games of chance. A budgeting simulation model using the Monte Carlo sub-routine requires inputs of means and variation parameters for uncertain variables in the budget. The variation parameter used is not restricted to standard deviations. Other probability distributions and their associated parameters could be used. Then, after the number of Monte Carlo simulations are completed to give a large number of expected outcomes, the probability distribution of those expected outcomes is calculated by the model and the mean and standard deviation of outcomes reported. The decision maker uses these estimates to select alternative opportunities which reflect the individual's preference for income and risk.

A fourth method of evaluating risk which can be used by a decision maker calculates a range of simple budgets for each opportunity. The decision maker prepares at least three budgets in order to evaluate an opportunity. These three represent optimistic, pessimistic, and most likely outcomes for the main risky components of the budgets. Then, after observing the budgeted outcomes of two or more opportunities, the decision maker decides upon one opportunity to select for implementation. These budgets could be computerized to reduce budget calculations and give solutions similar to those obtained using a Monte Carlo sub-routine without requiring the use of a large computer to process the very large number of calculations required to obtain reasonable solutions with the Monte Carlo sub-routine. However, these budgets cannot provide the decision maker with the detailed estimates of means and expected variation possible when the same budget data are evaluated using risk programming or Monte Carlo models.

FUTURE DIRECTIONS OF COP

HOW MANY COP'S ARE THERE AND WHAT ARE THEIR IMPLICATIONS FOR THE FUTURE[1]

H.C. DRIVER

The Theoretical Concept

The "true" cost of any resource allocated intra and intertemporally to any combination of enterprises is its opportunity cost, i.e. the income forgone by not allocating it to the next best activity combination. By minimizing the net opportunity costs of all resources over competing enterprises within the limits of resource availability, profits as well as resource returns are maximized. Ex post, the unit COP can be determined for any enterprise and by implication, there are as many unit COP's for any enterprise as there are different constrained multiperiod sets of production activities and related coefficients. COP per unit is indicative of cost economies or diseconomies to size and scale.

Factors Affecting COP'S

An obvious first step is to reduce the number of possible opportunity sets. This is possible for any commodity if farms can be classified into groupings characterized by homogeneity of quasi-fixed resource levels, production activities and related coefficients within class, and hetergeneity between class. Such an approach has been developed for the Ontario dairy industry by relatively recent research (3, 2, 1) which has inferred that two-way classification by technology of production systems and by production level per technical unit significantly reduces variation in opportunity costs of quasi-fixed resources and use of variable inputs, respectively.

Essentially, each cell of the classification systems effectively brought together farms with similar production functions, quasi-fixed resource-mix and management. For each cell, crop and livestock budgets developed from ODFAP records to estimate unit milk COP per farm and used in conjunction with regression of unit milk costs on volume of milk shipped, successively depicted discrete cost economies and diseconomies of size and scale in dairying. By implication, the points at which marginal cost equalled average cost for any technology class are known. Because of limitations, to one or more quasi-fixed resources, the marginal cost rises vertically from that point.

Regional classification had no significant affect on unit milk COP per farm (4). Although some coefficients varied significantly by region, farmers had primarily adjusted to these differences through asset evaluations.

A second step is to reduce budgetary errors arising from: (a) intertemporal cost estimation and allocation; and (b) intratemporal cost allocations among

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[1] Prepared by H.C. Driver, AE&B, University of Guelph, for the COP Seminar, Economics and Policy Coordination Branch, OMAF, February 3-4, 1986.

enterprises. That is to say that the "nuts and bolts" of asset evaluations and allocation procedures within and over time periods might affect the relativity amongst coefficients and COP's of farm enterprises.

Depreciation and amortization of long-lived assets as well as imputed values for labour, management and equity are quasi-fixed factor cost estimations. While each of these issues is problematic, perhaps the most troublesome is depreciation - an amount necessary to replace an asset. Simple rules of depreciation based on time and use of an asset are not enough, because obsolescence, inflation or disinflation, major repairs or improvements to assets and internal rate of return on the capital invested in them are factors which also affect asset values. The crucial issue is to find the closest approximation to the true depreciable and opportunity costs in an intertemporal context.

Farm enterprises utilize directly and indirectly, the intertemporal services of quasi-fixed resources. Direct enterprise costs depend on the rates of use of quasi-fixed factors and viable inputs and accordingly, use varies proportionately with the volume of production. Additionally, such services involve minimum external benefits (externalities) as in the case of residual carryover of fertilizer and herbicides from one crop to another, or feeds, supplements and minerals from one livestock enterprise to another. Direct cost allocations are possible when the services provided by an asset can be traced directly to a particular operation, and also expressed in physical, non-monetary terms.

Indirect cost allocations are just the exact opposite. They are joint costs of a common pool of assets. Traceability to a specific enterprise becomes difficult because the transfer of services from one to another cannot be represented in physical, non-monetary terms. The root cause of the problem of allocating joint costs is in selecting criteria which will ensure that these joint costs, once allocated to the various enterprises, will "allow" each enterprise to receive its "fair share" of the costs, i.e. the asset depreciation and/or opportunity cost as well as overhead required to conduct normal business operations.

It is these indirect services which pose major problems for both economists and accountants. What are the appropriate allowances for operator and family labour? What are the capital costs of holding assets? What proportions of the labour allowances and the annualized capital costs should be borne by each enterprise? What is a "fair share" allocation of the overhead expenses to enterprises? Do the cost determination and allocation methods and procedures reflect opportunity costs of the resources in question; or does the methodology in of itself introduce budgetary errors and correspondingly economic distortions?

Answers to these queries should be eventually forthcoming from a recently funded Ph.D. study entitled, "An Investigation into the Cost Estimation and Allocation Problems of Developing Credible Data Base Systems for the Canadian Dairy Industry". The methodology is currently being developed to: (i) identify and evaluate factors affecting asset evaluations; (ii) to determine accurate estimates of depreciation and imputed costs of capital; (iii) to ascertain the effects of alternative sets of allocation procedures and assumptions on enterprise budgets; and (iv) to compare and evaluate the effects on unit costs of production at various levels of aggregation.

Future Implications

The methodology to classify farms makes possible the estimation of cost economies or diseconomies to the size and scale effects of existing and potential advances in technology and managerial skills. This is particularly significant in view of the new biotechnology (e.g. Bovine Growth Hormone) and the philosophy of "freer trade", both of which will eventually affect farm structure and performance.

The combination of farm classification procedures with methodology to improve cost estimation methods and allocation procedures makes possible cost and response analyses based on opportunity cost adjusted budgets. Thus, the points at which average equals marginal milk production costs on the envelope curve are also opportunity cost adjusted and hence, provide alternative targets for milk pricing. This might be advantageous to know if incentives to adjust toward adoption of new biotechnology should be hypothesized as a means of lowering costs and raising consumption.

A final adjustment to make in using opportunity cost adjusted cost of production pricing in the short run is an allowance for opportunity costs between competing farm enterprises. This becomes necessary if significant changes in the relativity of one or more farm commodity prices should occur and affect the allocation of resources between competing enterprises.

Policies to stabilize prices and/or to manage supply and demand in any industry require opportunity cost adjusted COP estimates. Also needed is information ex ante and ex post which measures the effects of policy instruments such as price supports, supply management and/or adjustment incentives on farm structure and business performance.

The traditional methods of cost accounting farm enterprises provide only ballpark estimates of "true" COP at any point in time. Because they are generally not fully opportunity cost adjusted, their relationship to economic costs are coincidental at best and hence, not realistic as pricing vehicles. By implication, average cost of production estimates unadjusted for opportunity costs bear no consistent relationships to the underlying supply function of an industry. Worse yet, the effects of using such estimates as guidelines for quantifying policy instruments on industry structure and performance often remain unknown until ex post analysis can be conducted. This traditional approach is tantamount to playing Russian roulette with the economic and political consequences of agricultural policy.

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CLOSING

E.L. MENZIE

Given the time of day, I suspect many of you would rather I give a speech a little bit like the conference that went on with rodents. When it came time for the little mouse to get up and give its speech after sitting all afternoon on a cake of ice, he got up and said, "my tail is 'told'".

Since we are talking history, I am not going to let Jack Clark and Earl Haslett steal all the thunder here. In doing a little bit of digging, I found that some of things you talked about today do go back a long way. I guess you could even go back to Plato and Aristotle to find some of it. In the early 1920's in Ontario, indeed as Jack Clark indicated, there were cost of production studies going on. The Ontario Milk Producers' Association made some of these studies, for example, in establishing prices - even at that stage of the game. Cost of production study was also conducted in the tomato industry for assisting in establishing the canning company prices. Indeed, a third use of cost of production was in helping farmers make management decisions. Thus, the more things change, the more they remain the same.

In my talk, I would like to concentrate on three major items. These are the uses of cost of production; the problems with it; and, then finally, a summation. I gathered from the discussions this morning that there are about six groups that use cost of production in one way or another. These include financiers, who are involved in helping to provide cash for farmers, extension specialists, in one way or another, and marketing boards and other producer groups, in trying to establish prices. Additionally, policy analysts in the federal and provincial governments, producers on the farm as well as researchers use cost information in decision making and analysis.

From these groups of cost information users, a number of key points can be identified. The financiers believe it is necessary to monitor stress levels and risks in their portfolios and they need some indication of costs in order to do this.

Additionally, this information is used to assist in counselling their clients. This activity have become increasingly important in recent years as financiers' clients have observed some of their investments going down the drain. I do not think these activities were done much until very recently.

Extension specialists have shown the need to use cost of production information and data in order to advise producers on management decisions and practices. They use it as a basis for comparisons of industry benchmarks to individual farmers. This can assist them in making financial management and marketing decisions.

For marketing boards and other producer groups who are involved in establishing a price, cost of production is key component of their formulae. As Peter Gould of the Ontario Milk Marketing Board indicated this morning, various pricing groups use various other elements in their formula. Cost of production, however they are determined, tends nonetheless to be a key element in establishing prices. Some other boards use cost of production as a guide in attempting to negotiate price.

In policies and stabilization programs, the federal and provincial governments depend on cost of production information. This information, for instance, cash costs, is used in existing stabilization programs. Government also use cost of production as a means of monitoring producer pricing and the supply-management schemes, both at the national and provincial levels. They are using this information for evaluating the impacts of free trade. Additionally, cost of production is utilized in determining the feasibility of selective types of processing industries and as a basis for rebates of interest.

Producers use cost of production to help them make vital decisions. For this purpose, cost of production must include risk orientation if producers are to make rational investment decisions. These decisions may be long run ones such as purchasing a farm or short run ones in regards to daily activities. Producers also need cost of production information on an operation basis as well as an industry level in order to determine their own position relative to the industry as a whole.

Finally, researchers use cost of production data for analysis of efficiency in the production and marketing system and to study the impact of various policy options, including that of administered pricing programs. In research and technology programs cost information also assists in establishing priorities in research investments and program evaluation. Often it is necessary to determine cost of production to estimate the impact of new types of technology coming on the scene. A prime example of the use of cost information in research is in evaluating the impact of new technology (like Bovine growth hormone) on the dairy industry. This hormone has the potential of increasing milk production per cow by 20 to 30 percent. We, therefore, need to have some cost estimates of the potential impacts of such technologies.

What are some of the problems that seem to be emerging from this discussion, according to my own observation? First, there appears to be a great deal of controversy. There is controversy over the methodology. Much depends on the use of the cost of production estimates. There is controversy over the allocation of costs in joint production systems. There is controversy over the valuation of inputs - management capital for example. Questions are raised about land values - how should these be put in? At the high cost the farmer paid, or the low cost that it is now worth? What about labour and buildings? And what about other kinds of overhead? What about quota values - how should they enter into the system of costs? What interest rate should be charged? What return on capital is appropriate? Are we making comparisons with bond markets or other markets? Are opportunity costs considered? Are the costs in terms of long run or short run? Thus, there are lots of questions that seem to be raised - but not too many answers.

Cost of production depends on the items included in the formula, which seems to depend on the use being made of the cost of production itself. Cash costs are used in stabilization programs. In other cases, we will use all the costs. Considerations of corporate risk in the cost of production models, particularly in the firm management decision process, are important, however, in the provision of financial advice by the financial institutions and also extension. There is even controversy over the use of cost of production in formula pricing.

Finally, there is a lack of data at the farm level to make analysis possible and to provide a basis for management assistance. It is constantly stated, again and

again, that farmers dislike economics and record keeping but this can be taken one step further by saying farmers dislike economists and they do not keep records.

Part of the reason for this is that economists often have bad stories to tell and who would like that. Farmers, however, are a basic element in any kind of a cost of production formula that you set up or any kind of cost of production analysis you do.

I can recall working with some farmers who used to argue that the government data was very poor. When they were questioned about the data given in response to the Census, being honest about it, at that point, they would say "no way am I going to tell them everything I've really got." How then do farmers expect the results of that data to be accurate or to provide good predictive capabilities if you cloud the basic information that is provided. It is important to get the farmer to recognize his need for good data and to provide it in the collection process.

What are some of the conclusions? Well, one conclusion I guess that despite all the changes, there is little new. Cost of production conclusions remain highly controversial and they are varied in use. They are varied in the estimation methodology and they are varied in definition. Additionally, there needs to be more consistency in the evaluation and costing. Perhaps one might say production economists need to get their act together.

The cost of production is of primary value in investment and management decisions by financial institutions. I think we all would agree with that. There is a need, therefore, to refine the data collection and analysis and to incorporate risk in models in order to aid farm management decisions. There is a need for emphasis at the farm level on cost information to improve the decision making process at this level.

From today's events, we know that cost information is being used, both by farm groups in trying to establish price where they have those powers, and by governments in establishing policy for stabilization programs and other kinds of support or subsidy mechanisms. I would suggest that caution is necessary in using cost of production estimates for policy decisions by government and pricing decisions by producers, given the information provided today. Since governments and producers are likely to continue using cost of production for these purposes, I think it is appropriate to make reference to a statement by a Nobel Prize winning economist who said, "price determines cost, rather than vice-versa".

"Grain land is dear because the price of grain is high. Apartment buildings sell for much because rents are high."

BIOGRAPHIES

ANDY BUNN

Andy Bunn is a Swine Livestock Specialist with the Extension Branch, Ontario Ministry of Agriculture and Food. He is well known for a monthly publication on the pork industry called "Pork News and Views."

BLAIR CAMPBELL

Blair Campbell is an Economist with the Economics and Policy Coordination Branch, Ontario Ministry of Agriculture and Food.

JACK CLARK

Jack Clark is a professor in the Department of Agricultural Economics and Business, University of Guelph.

MAX COLWELL

Max Colwell is the Acting Director of the Inputs and Technology Analysis Division, Policy Development Directorate, Agriculture Canada.

Max Colwell has a Ph.D. from the University of Reading, Berkshire, England which he earned in 1976. He has a wide variety of publications to his name and has well over a decade of experience in agriculture.

H.C. DRIVER

H.C. Driver was born at Portage la Prairie, Manitoba. Raised in the Portage District and he later farmed with his father. He received B.S.A (1959) and M.Sc. (1961) degrees from the University of Manitoba. His areas of emphasis were in the field of Agricultural Economics. Worked as Agricultural Extension Economist in the Extension Branch and later in the Economics Branch, Manitoba Department of Agriculture during which time he received a Ph.D. (1969) degree in Agricultural Economics from Iowa State University.

Accepted a position of Associate Professor of Agricultural Economics at the University of Guelph in 1970 and after completing a year's sabbatical leave at Oregon State University was promoted to full professor in 1980. Since joining the faculty at University of Guelph, his responsibilities have included: (a) teaching Applied Mathematical Economics and Farm Management to undergraduates as well as Advanced Topics in Linear Programming, Case Studies in Farm Management and Research Methodology to graduate students; and (b) research in production economics and farm management with emphasis on Analysis of Supply Management Problem Issues in the Canadian Dairy Industry, Business Analysis and Management of Commercial and Limited Resource Farmers, Production Cost Analysis of Milk and Lamb Production, and Farm Organizational and Supply Responses to Risk in Agriculture.

G. ALAN FISHER

Alan Fisher, a native of Kent County, received his early education in the area and graduated from the University of Guelph in 1952. Since graduation, he has been employed by the Economics and Policy Coordination Branch, serving locations in Toronto, Woodstock, and moved to Chatham in 1962.

At the present time he is head of the Financial Analysis Section of the Branch. This section is responsible for economic studies on costs and management practices for all crops and livestock across Ontario. The section also produces surveys on custom farmwork rates, and cash rental charges in Ontario.

PETER GOULD

Peter Gould was raised on a farm in Wentworth County. He attended the University of Western Ontario where he received his Bachelor of Arts degree in Economics in 1971.

Peter continued his studies at the University of Waterloo and completed his Honours Qualifying Year in Economics in 1972. He then went to Brunel University in London, England, where he received his Masters degree in Economics in 1974.

Prior to joining The Ontario Milk Marketing Board, Peter worked as an economist for the Canadian Transport Commission in Ottawa from 1976-1981.

Peter has been an economist at The Ontario Milk Marketing Board since that time. Included among his duties are the maintenance of the fluid pricing formula, the Producer Data Bank and Multiple Component Pricing. Special projects have included an analysis of the Economic Council of Canada's Report on Reforming Regulation with Regard to Milk and Dairy Products. Peter's current activities include work on alternative methods of allocating industrial milk supplies and he is closely involved in the dairy industry's concerns regarding bilateral trade negotiations with the United States.

EARL HASLETT

Earl Haslett was born on a dairy farm at Bonarlaw in Hastings County, Ontario. Following service in the Canadian Army he attended the Ontario Agricultural College, Guelph. He graduated in 1949 with a B.S.A. degree, specializing in agricultural economics. Further study at the University of Toronto in general economics led to a M.S.A. degree in 1953. Additional work in political economy resulted in a Ph.D. degree from the University of Toronto in 1969.

In 1949 Earl joined the Farm Economics Branch of the Ontario Department of Agriculture as a production economist. Following periods as a marketing economist and Associate Director he was appointed Branch Director in 1969 and held that position for 13 years. Currently as an economic consultant he retains an interest in agricultural policy issues.

GRAEME W. HEDLEY

Graeme Hedley was born into a farming family (beef cattle and swine) in Seneca Township, Haldimand County near Canfield, Ontario. In early life, he attended S.S. No. 1 (Seneca) public school and Caledonia and Hagersville High Schools. He was active in county 4-H clubs (beef, swine, field crops) serving briefly as club leader as well as being active in the local Junior Farmers Association. Upon graduation from high school in 1960, he attended the Ontario Agricultural College selecting the Animal Science option and graduating with a Bachelors Degree in 1964. While there, he was a member of both the dairy and livestock judging teams, Animal Science Club, and participated in College Royal in the livestock showmanship competition and square dancing competition.

Following graduation, Graeme Hedley was employed by the Livestock Branch, Ontario Ministry of Agriculture and Food as a Fieldman responsible for carrying out many of the programs administered by that Branch. In that capacity, he travelled through and became familiar with practically every part of rural Ontario and the producers of swine, beef cattle and sheep who were engaged in breed improvement programs. In 1967, he sought leave of absence to return to the University of Guelph to obtain a Master Degree in Animal Breeding. In 1968 he returned to the Ministry in the capacity of a Beef Cattle Extension Specialist located at the University.

In May, 1970, Mr. Hedley left the Ontario Ministry of Agriculture and Food to become Manager of the Ontario Beef Improvement Association now known as the Ontario Cattlemen's Association, the position he continues to hold.

MARTIN JAEGER

Martin Jaeger is a Senior Policy Advisor with the Economics and Policy Coordination Branch, Ontario Ministry of Agriculture and Food. He has a wide range of experience in agriculture, including a lengthy work history in commodity stabilization.

DOUG LANE

Born and raised on a mixed farm in Durham County. Graduated from the University of Guelph in 1967 with a degree in Soil Science.

Worked for FCC in Woodstock as a Credit Advisor for four years and then returned to school to get a Masters degree in Agr. Economics.

Having worked for FCC in various capacities except for a little over one year when he was employed as an Agriculture Officer with C.I.B.C. Presently Research Officer in the Ontario Regional Office at Guelph.

Married with two children.

ART LAWSON

Art Lawson is a Farm Business Advisor with the Agricultural Representatives Branch, Ontario Ministry of Agriculture and Food.

GARY LENTZ

Gary Lentz was born and raised on a cash grain and livestock farm in Nebraska. He attended Wayne State College in Nebraska, the University of Illinois at Champaign-Urbana and the University of Nebraska at Lincoln where he received B.S. and Ph.D. degrees in agricultural economics. Dr. Lentz has been employed by the USDA's Economic Research Service in Washington. He joined the Economics Branch in 1972. He served as liaison officer at the University of Guelph and currently is Senior Policy Advisor in the Economics and Policy Coordination Branch, Ministry of Agriculture and Food.

Dr. Lentz's professional interests include production economics in which he has published several articles. He has also published in the area of resource economics and land values. He holds memberships in several professional organizations and societies.

ROBERT LINDSAY

Robert Lindsay is Farm Records System Specialist and Team Leader of The Agriculture Computer Extension Program for the Ministry of Agriculture and Food, Ontario.

ERROL MCKIBBON

Errol McKibbon is an economist with the Economics and Policy Coordination Branch, Ontario Ministry of Agriculture and Food.

ELMER MENZIE

Dr. Menzie is the chairman of the Department of Agricultural Economics and Business at the University of Guelph.

SAYAD RIZVI

Sayad Rizvi is the Chief of the Production Cost Analysis Section, Regional Development Branch, Agriculture Canada. Dr. Rizvi has a wide range of academic and professional experience in agriculture.

JAMES R. SANDEVER

- Acting Vice-Chairman, Farm Products Marketing Board.
- M.Sc. and B. Sc. (Agr.) in Agricultural Economics from O.A.C., University of Guelph.
- Quota Control Manager for two years with the Ontario Egg Board (1978-1980).
- Joined the Farm Products Marketing Branch in July 1980 as a marketing officer and appointed acting secretary to the Farm Products Marketing Board and Milk Commission of Ontario.
- In May 1985, appointed as acting Vice-Chairman, Farm Products Marketing Board.
- Special emphasis has been given to national poultry issues and more recently the tobacco situation in Ontario.

JOE SCHAEFER

Joe Schaefer is Project Manager of the Ontario Dairy Farm Accounting Project.

R.A. SCHONEY

Dr. R.A. Schoney is a professor in the Department of Agricultural Economics at the University of Saskatchewan.

DEIRDRE SHUTE

Deirdre Shute is a Senior Economist with the Production Cost Analysis Section, Development Policy Directorate, Agriculture Canada. She has been with Agriculture Canada in various positions for 15 years.

APPENDIX

APPENDIX I - Page 1: SUMMARY OF PORK PRODUCTION COSTS AND RETURNS DECEMBER, 1985

HOG ENTERPRISE	RETURN TO LABOUR/HOG	*OPERATING COSTS/CWT	*CAPITAL COSTS/CWT	*BREAK-EVEN COST/CWT	**BREAK-EVEN COST/CWT
A. Feeder Pig	+15.83	47.34	33.00	80.34	105.34
B. Farrow to Finish	+21.78	54.60	6.53	61.13	73.19
C. Finish	+14.70	58.74	6.53	65.27	70.90

* No labour charge included in costs

** Labour charge of $423.02/week included in costs (Sept. 1985)

A. FEEDER PIG ENTERPRISE BUDGET - 100 SOWS - PER SOW			Your Costs
Income: -			
16 weaners @ 50 lbs. @ $112/cwt = $56.00 x 16		896	
Operating Costs:			
(1) Feed - Dry, Nursing and Boar Ration 2600 lbs. @ $7.41/cwt	192.66		
Pig Prestarter - 124 lbs. @ $16.51/cwt	20.47		
Pig Starter - 960 lbs. @ $16.51/cwt	79.01		
(2) Services - Vet and Medicine	30.00		
Marketing (sows and feeder pigs)	22.42		
Hydro (24.00)	24.00		
(3) Interest on Feed and Services - $368.56 x 11.00 x .5 x .5	10.14	378.70	
Capital Costs: - (41% Sow Ownership)			
(1) Depreciation - Original Value-Salvage Value 252.62 - 161.56 / Number of Productive Years	36.42		
(2) Interest on Investment - 252.62 + 161.56 - 2 = 207.09 x 8.50	17.60		
(3) Death Loss - Average Value 207.09 x 5.0	10.35		
(4) Boar Ownership - Original Value + Cull Value - 2 x 4% 505.24 + 154.40 - 2 = 329.22 x 4%	13.19		
(5) **Housing (16.6% x 141,125 - 100 sows x 50%)	117.13		
(6) **Equipment (22.15% x 62,581.90 - 100 sows x 50%)	69.31	264.00	
TOTAL COST 80.34/cwt based on 50 lb. feeder pig or 40.17/feeder pig		642.70	
NET RETURNS TO OWNERS LABOUR RISK AND MANAGEMENT = 15.83/feeder pig		253.30	

B. FINISHING PORTION BUDGET OF FARROW TO FINISH ENTERPRISE - (1600 hogs/year) INCOME PER HOG			
Income: -			
171 lbs. Hog Dressed Weight @ 71.31 per cwt x 103.5 index		126.31	
Operating Costs: - (90%)			
(1) Feed - 578 lbs. @ 7.40 per cwt.	42.80		
(2) Services - Veterinary Medicine	2.00		
Marketing	2.75		
Hydro	1.00		
(3) Feeder Pig Cost - SEPT. 1, 1985 = 40.07 - 1.00	39.07		
(4) Death Loss - Average Value = 126.31 + 39.07 - 2 x 3%	2.48		
(5) Interest on Feed, Services, Feeder Pig Cost 90.10 x 11.00 x .33	3.27	93.37	
Capital Costs: (10%)			
(1) **Housing (16.6% x 135,885 - 1600 x 50%)	7.05		
(2) **Equipment (22.15 x 59,423.10 - 1600 x 50%)	4.11	11.16	
TOTAL COSTS PER HOG MARKETED 61.13/cwt. based on 171 lb carcass		104.53	
NET RETURNS TO OWNERS LABOUR RISK AND MANAGEMENT PER HOG MARKETED		+ 21.78	

C. FINISHING BUDGET (PURCHASED FEEDER PIGS) ENTERPRISE - (1600 Hogs/Year) INCOME PER HOG		
Income: - Similar to B ($126.31)		
Operating Costs: (90%) Feed 42.80, Services 4.75, Feeder Pig Cost (Sept. 1, 1985) 42.00 + 3.80 = 45.80 Death Loss 2.58, Interest 95.93 x 11.00 x .33 = 3.52	100.45	
Capital Costs: - (10%) **Housing 7.05, **Equipment 4.11	11.16	
TOTAL COSTS PER HOG MARKETED 65.27/cwt based on a 171 lb. carcass	111.61	
NET RETURNS TO OWNERS LABOUR RISK AND MANAGEMENT PER HOG MARKETED	+14.70	

**IF NEW BUILDINGS AND EQUIPMENT ARE USED THESE FIGURES SHOULD BE DOUBLED.

APPENDIX I - Page 2: PROJECTED COST/CWT. (LABOUR NOT INCLUDED)

1984 Average Input Costs and Returns

	Pigs Marketed Per Sow Per Year			
ENTERPRISE	16	18	20	22
Feeder Pig	87.00	79.00	72.60	67.40
Farrow-Finish	68.60	65.47	62.91	60.76

PROJECTED RETURNS HOG FINISHING ENTERPRISE-PER HOG MARKETED

*Projected Income: -		
April/86 Futures (Jan. 7/85) 42.00 - .79 - 103.5 - 1.00 x 1.3991 - 10.64 (Basis) 171 lbs. x 57.92		99.04
*Projected Operating Costs:-		
(1) Feeder Pig - 50 lbs. x 112.0 = 56.00 + 3.80 Commission & Transportation	59.80	
(2) Feed Cost - 578 lbs. x 7.76	44.88	
(3) Services - Vet. Mkting., Hydro (5.75), Death Loss (2.38), Int. (4.10)	12.23	
*Projected Capital Costs: - Housing and Equipment	11.16	128.07
NET RETURNS TO OWNERS LABOUR RISK AND MANAGEMENT PER HOG MKTD.		-29.03

*Please note: - There is no guarantee that these projections will apply in April/86

MARKET SUMMARY

Southwestern Ontario Feeder Pig Prices Per Lb. Live (based on a 50 lb. Feeder Pig)

YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	AVERAGE
1983	1.45	1.53	1.33	1.17	1.11	.79	.61	.60	.67	.60.	.62	.86	.95
1984	.90	1.02	.86	1.14	1.04	.88	.84	.88	.96	.90	.92	1.09	.95
1985	1.01	1.10	.99	.84	.86	.94	.82	.79	.84	.94	1.05	1.12	.94

Ontario Market Hog Pool Prices Per Cwt. Dressed

1983	83.71	85.92	79.54	72.19	71.91	69.32	67.06	70.28	68.52	61.72	60.59	64.13	70.91
1984	67.50	65.60	67.34	70.85	72.62	76.38	81.85	81.37	74.81	69.59	72.77	72.64	72.54
1985	72.41	73.17	68.99	59.31	62.32	68.18	71.34	67.09	64.85	68.54	71.94	71.37	68.22

NET RETURNS PER HOG MARKETED TO OWNERS LABOUR RISK AND MANAGEMENT

Feeder Pig Enterprise

1983	26.36	38.22	27.06	18.49	16.22	5.49	-9.86	-16.32	-9.34	-15.17	-14.67	-6.54	4.99
1984	2.14	7.33	-2.73	12.18	4.39	-2.15	-4.41	-1.10	2.06	4.73	5.28	14.24	3.50
1985	9.47	13.55	8.42	.51	2.36	6.07	-.11	-0.20	1.93	8.58	14.17	15.83	6.72

Farrow to Finish Enterprise

1983	35.36	49.65	43.89	22.79	18.55	9.14	2.94	.93	5.43	-5.01	-16.59	-9.98	13.11
1984	-3.76	-5.38	-3.04	2.23	5.29	8.99	15.79	16.59	4.93	-.63	9.58	10.86	5.12
1985	20.94	21.12	14.50	-3.61	.33	11.78	16.25	10.81	7.14	15.05	22.47	21.78	13.21

Finishing (Purchased Feeder Pigs) Enterprise

1983	-5.26	12.34	8.24	-10.80	-13.09	-34.99	-29.42	-22.39	-15.49	14.56	-9.99	3.44	-11.26
1984	8.28	6.14	-0.11	1.29	-.94	-2.78	14.32	-.33	-3.76	-2.33	6.76	4.75	2.61
1985	10.66	10.48	4.43	-18.68	-19.01	-2.15	10.66	3.27	-4.34	10.11	11.16	14.70	2.61

** CORN (PAYING PRICE/CWT. BY FEED MILLS IN LONDON AREA)(TO CONVERT TO BUSHELS x .56)

1984	6.79	6.70	7.23	7.82	8.00	8.27	8.27	8.04	8.57	5.84	5.91	6.07	7.29
1985	6.07	6.21	6.18	6.82	6.86	6.79	6.64	6.11	6.07	4.91	4.93	5.63	6.10
1986	5.71												5.71

**44% SOYBEAN MEAL (PRICE/CWT. TORONTO WHOLESALE + 18.00/TONNE FREIGHT

1984	15.02	14.09	14.52	14.60	14.00	13.98	13.30	11.98	12.07	11.61	11.95	11.08	13.18
1985	10.70	10.80	10.83	10.71	10.2	9.52	10.08	9.72	11.10	11.68	12.25	12.20	10.81
1986	12.76												12.76

**COMMERCIAL BANKS - PRIME INTEREST RATES

1984	11.00	11.00	11.00	11.50	11.50	12.00	13.30	13.50	13.00	13.00	12.50	12.00	12.11
1985	11.25	11.00	11.50	11.25	10.75	10.50	10.50	10.25	10.25	10.25	10.00	10.00	10.65
1986	10.50												10.50

**Please note: Corn, Soybean Meal and Interest Rates are based on 1st of month quotations.